



Specifications

FOR

CONTRACT PACKAGE 5 – RETURN FLOW PIPELINE

Volume I of I

**Greeley and Hansen LLC
741 North Grand Avenue, Suite 308
Waukesha, Wisconsin 53186**

March 2020

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WAUKESHA WATER UTILITY
GREAT LAKES WATER SUPPLY PROGRAM

TABLE OF CONTENTS

VOLUME I OF I

PROCUREMENT AND CONTRACTING REQUIREMENTS

NOTICE TO BIDDERS	00 11 13
INSTRUCTIONS TO BIDDERS	00 21 13
CERTIFICATION OF DEBARMENT	00 32 00
BID FORM	00 41 00
BID BOND	00 43 00
USE OF AMERICAN IRON AND STEEL (UAIS) REQUIREMENT	00 45 49
NOTICE OF AWARD	00 51 00
AGREEMENT	00 52 00
NOTICE TO PROCEED	00 55 00
PERFORMANCE BOND	00 61 13
PAYMENT BOND	00 61 16
GENERAL CONDITIONS	00 72 00
SUPPLEMENTARY CONDITIONS	00 73 00
DISADVANTAGED BUSINESS ENTERPRISE (DBE) AND LOCAL BUSINESS PARTICIPATION (WAUKESHA WATER UTILITY REQUIREMENTS)	00 73 39
U.S. ENVIRONMENTAL PROTECTION AGENCY CERTIFICATION OF NONSEGREGATED FACILITIES	00 82 30
NOTICE TO LABOR OR UNIONS OR OTHER ORGANIZATIONS OF WORKERS NONDISCRIMINATION IN EMPLOYMENT	00 82 40
DISADVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION	00 82 50
SIGNATURES AND SEALS	00 90 00

TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

Summary of Work	01 11 00
Change Order, Work Change Directive and Field Order Procedures	01 26 00
Measurement and Payment	01 29 00
Coordination and Meetings	01 31 00
Project Management Information System	01 31 25
Progress Schedule	01 32 17
Submittals	01 33 00
Regulatory and Special Requirements	01 41 00
References	01 42 00
Preconstruction Videos	01 44 00
Quality Control	01 45 00
Leakage Tests	01 45 50
Construction Facilities and Temporary Controls	01 50 00
Material and Equipment	01 60 00
Lines and Grades	01 71 23
Cutting and Patching	01 73 29
Cleaning	01 74 00
Contract Close Out	01 78 00
Operation and Maintenance Manuals	01 78 23
Training	01 79 00

DIVISION 2 - EXISTING CONDITIONS

Impacted Soil and Groundwater Management	02 50 00
--	----------

DIVISION 26 - ELECTRICAL

Basic Electrical Materials and Methods	26 05 00
Electric Utility Coordination and Requirements	26 05 10
Wires and Cables - 600 Volts and Below	26 05 19
Grounding	26 05 26
Electrical Raceway Systems	26 05 33
Panelboards	26 24 16

DIVISION 31 - EARTHWORK

Site Clearing	31 10 00
Excavation	31 23 16
Dewatering	31 23 19
Backfilling	31 23 23

Erosion and Sediment Controls	31 25 13
Shoring, Sheet piling and Bracing	31 41 00

DIVISION 32 - EXTERIOR IMPROVEMENTS

Base Courses	32 11 23
Asphalt Paving	32 12 00
Concrete Paving	32 13 00
Concrete Curbs	32 16 13
Concrete Sidewalks	32 16 23
Permanent Pavement Markings	32 17 23
Landscaping Work	32 90 00
Traffic Control	32 95 00

DIVISION 33 - UTILITIES

Horizontal Directional Drilling	33 05 22
Jacking, Augering and Mining	33 05 23
Laying and Jointing Buried Pipelines	33 05 50
Buried High Density Polyethylene Pipe and Fittings	33 05 53
Polyethylene Encasement	33 05 54
Buried Ductile Iron Pipe and Fittings	33 05 55
Stainless Steel Pipe and Fittings	33 05 56
Cathodic Protection	33 05 58
Pipeline Vaults	33 05 61
Locating Buried Pipelines	33 05 70

DIVISION 40 - PROCESS INTEGRATION

Supports and Anchors	40 05 01
Valves	40 05 20
Process Control System Commissioning	40 80 50
Process Control System General Requirements	40 90 00
Process Control System Description	40 90 50
Process Control System Instruments	40 91 00
Process Control System Computer and Network Hardware	40 94 13
Programmable Logic Controller Systems	40 94 43
Process Control System Panel Enclosures and Equipment	40 95 13
Process Control System Factory Acceptance Testing	40 98 50

APPENDIX BOOK I OF III

APPENDICES

- Appendix I 4-230 D2 Phase II Environmental Site Assessment Report – Site 12.17 – 2000 South West Avenue, Waukesha, Wisconsin
- Appendix II 4-230 D3 Phase II Environmental Site Assessment Report – Site 12.51 – 1011 Sentry Drive; Waukesha, Wisconsin
- Appendix III 4-230 D6 Phase II Environmental Site Assessment Report – Site 12.57/12.58 – 303-309 Sentry Drive; Waukesha, Wisconsin

APPENDIX BOOK II OF III

APPENDICES

- Appendix IV 4-220 D8 Geotechnical Report, Contract Package 5, Return Flow Pipeline Stations 0+00 to 1000+00
- Appendix V 4-220 D9 Geotechnical Report, Contract Package 5, Return Flow Pipeline Stations 2000+00 to 3000+00
- Appendix VI Canadian National Railway Company Crossing Criteria
- Appendix VII National Avenue Bridge Information

APPENDIX BOOK III OF III

APPENDICES

- Appendix VIII Pothole Information
- Appendix IX WE Energies Contact Information and Utility Worksheet
- Appendix X Easement Documentation
- Appendix XI Section 404 and Chapter 30 Permit Approvals

Appendix XII 3-110 D1 Wetland and Waterway Restoration Plan

Appendix XIII 4-240 D1 Endangered Resources Compliance Plan

Appendix XIV 4-140 D6 Unanticipated Archaeological Discoveries
Plan

Appendix XV Clean Water Plant Wastewater Facilities Plan
Amendment Approval

(NO TEXT FOR THIS PAGE)

SECTION 00 11 13

NOTICE TO BIDDERS

WAUKESHA WATER UTILITY
CITY OF WAUKESHA, WISCONSIN
CONTRACT PACKAGE 5

Sealed bids will be received for the construction of the Waukesha Water Utility, City of Waukesha, Wisconsin, Contract Package 5. Bids will be received electronically, via Quest Construction Data Network (QuestCDN - www.QuestCDN.com). If a bid is sent by mail or other delivery system, it will not be accepted and returned unopened to the contractor. Bids must be uploaded, submitted, and finalized prior to the time listed below. It is strongly recommended that bidders take sufficient time and begin the uploading process before bids are due. Please contact QuestCDN at (952) 233-1632 or info@questcdn.com for assistance during submission and to confirm submission of the bid.

The bids will be received by the Waukesha Water Utility on April 30, 2020, at 10:00 A.M. Prevailing Time, electronically, via QuestCDN, at which time and place they will be publicly read aloud at the Waukesha State Bank, downtown, located at 151 Saint Paul Avenue, Waukesha, Wisconsin, 53187.

The Work comprises furnishing all labor, materials, equipment, supplies and services for the following:

Approximately 4.26 miles of new Return Flow Pipeline from the City of Waukesha's Clean Water Plant located on Sentry Drive in the City of Waukesha to a connection to Contract Package 2B located at the intersection of Les Paul Parkway and East Sunset Drive in the City of Waukesha.

Approximately 5.66 miles of new Return Flow Pipeline from a connection to Contract Package 2B located near the intersection of South Swartz Road and South Racine Avenue in the City of New Berlin to the connection to Contract Package 6 located west of the intersection of South Westridge Drive and West Small Road in the City of New Berlin.

A segment of the Return Flow Pipeline will be provided by others under Contract Package 2B between the two Return Flow Pipeline segments noted above.

Work for the above pipeline segments includes open-cut construction of pipelines comprised of 30-inch ductile iron pipe, jacking and boring of 48-inch steel casings beneath railroads and roads, including Interstate Highway 43 (IH 43), horizontal directional drilling of 36-inch high density polyethylene pipe, isolation valves, blow-off assemblies, air valves, fittings, vaults, cathodic protection, testing, traffic control, erosion and sedimentation control, connections to other Contract Packages, restoration of roadway, landscape, and other existing infrastructure, obtaining and complying with permits, startup, commissioning, training, and other

appurtenant Work as shown and specified in the Contract Documents titled Contract Package 5.

Bidders submitting for Contract Package 5 are eligible to submit an alternate bid price to complete all of the work for Contract Package 5 and Contract Package 6. The alternate bid price to complete both Contract Packages 5 and 6 will be included with Contract Package 6 bid form.

Contract Package 6 will include:

Approximately 11.27 miles of new 30-inch ductile iron pipe main (referred to as the “Return Flow Pipeline”) from the contract package interface with Contract Package 5 located on Small Road west of the intersection of Small Road and Westridge Drive in the City of New Berlin to the new Outfall Facilities at the Root River located at the southeast quadrant of the intersection of South 60th Street and West Oakwood Road in the City of Franklin. Work includes open cut construction of the new pipeline, steel casings via the jack and bore method, horizontal directional drilling, isolation valves, blow-off assemblies, air valves, fittings, cathodic protection, testing, traffic control, erosion and sedimentation control, obtaining applicable permits, traffic control, restoration of roadway, landscape, and other existing infrastructure, startup, commissioning, training, and all other appurtenant Work as shown and specified in the Contract Documents entitled Contract Package 6.

Approximately 3,950 linear feet of new 18-inch fiberglass reinforced plastic (FRP) or polyvinyl chloride (PVC) pipe (referred to as the “18-Inch Sanitary Sewer”) from the connection point located on 60th Street, just south of Ryan Road in the City of Franklin to the existing sewer collection system near the 60th Street Industrial Park Lift Station located on 60th Street, about 4,000 feet south of Ryan Road in the City of Franklin. Work includes open cut construction of the new sanitary sewer (or approved alternative construction method), installation of concrete manholes, backfilling and compaction, upstream and downstream tie-in connections to the existing sewer system, startup, commissioning, training, bypass pumping, and abandonment of the 60th Street Industrial Park Lift Station. Per Specification 01 29 00, the Work for the pipeline installation portion of the contract is limited to only the Work that occurs starting 6 inches below the invert of the adjacent Return Flow Pipeline, except for the manhole installation, which is fully included in this Work item.

Any contract or contracts awarded under this Notice to Bidders are expected to be funded by a combination of Environmental Protection Agency (EPA) Water Infrastructure Finance and Innovation Act (WIFIA) program and the Wisconsin Department of Natural Resources (WDNR) Clean Water Funding Program (CWFP). All federal regulations, policies, guidelines and requirements as they relate to the acceptance of federal funds for this project shall be complied by Bidders. Neither the EPA or State of Wisconsin nor any of its departments, agencies, or employees is or will be a party to this Notice to Bidders or any resulting contract.

The procurement will be subject to the Federal Davis Bacon Act wage rules. All laborers and mechanics employed by contractors and subcontractors on projects shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as

determined by the Secretary of Labor in accordance with subchapter IV of Chapter 31 of Title 40, United States Code.

This procurement will be also subject to the loan recipient's policy regarding the increased use of disadvantaged business enterprises (DBEs). DBEs are encouraged to submit Bids and proposals for this contract. The loan recipient's policy requires all bidders to undertake specified affirmative efforts and document the process with the required contract forms in Section 00 82 50, or provide a copy of their bid advertisement.

The procurement will be subject to Waukesha Water Utility requirements on DBE and Local participation in accordance with Section 00 73 39.

Bidders are also required to comply with the President's Executive Order No. 11246, as amended. The requirements for bidders and contractors under this order are explained in 41 CFR 60-4. Bidders are also required to adhere to the requirements of the Use of American Iron and Steel Requirement in accordance with the Consolidated Appropriations Act, the Water Resources Reform and Development Act, and Wisconsin State Statutes.

Bidders are required to be prequalified. General and first-tier subcontractors that are prequalified are listed on the Great Water Alliance website (<http://greatwateralliance.com/contractors/>).

Each Bid must be accompanied by a certified or bank cashier's check on a solvent bank or trust company, drawn to the order of the Waukesha Water Utility, or an acceptable Bid Bond on the form attached, in an amount of not less than 5 percent of the total bid. This sum is a guarantee that, if the Bid is accepted, a contract will be entered into and its performance properly secured.

A mandatory pre-bid conference will be held on March 31, 2020 at 1:30 P.M. at the Citizens Bank, 2109 Corporate Drive, Waukesha. Prospective Bidders are required to attend this conference. Bids submitted by Bidders who have not attended the pre-bid conference will not be accepted.

The Bidding Documents, Contract Documents, Specifications, Drawings, and Addenda, if any, may be digitally downloaded beginning March 17, 2020, from QuestCDN (www.QuestCDN.com) for a non-refundable fee of \$15 by inputting QuestCDN Project # 6887189 on the website's project search page. Please contact QuestCDN at (952) 233-1632 or info@questcdn.com for assistance in free membership registration, downloading, and working with this digital project information. Paper copies of the documents will not be available for purchase or examination. All bids will be received online only. Bidders are required to pay \$30 to submit online bids.

The Waukesha Water Utility reserves the right to reject any or all Bids or to waive any informalities and to accept the bid which it deems most favorable to the interests of the Waukesha Water Utility, after all bids have been examined and canvassed.

The letting of the work described herein is subject to the provisions of Sec. 62.15, 66.0901, 779.14, 779.15, Wisconsin Statutes, and all other relevant provisions of federal, state, and local law.

Waukesha Water Utility

By: Daniel S. Duchniak, P.E.
Title: General Manager

Date of Notice: March 17, 2020
March 24, 2020

END OF SECTION

SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

ARTICLE 1 DEFINED TERMS

1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural form thereof:

- A. Commission - Commission shall mean the Waukesha Water Utility Commission, Waukesha, Wisconsin.
- B. Issuing Office - Issuing office shall mean the office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.
- C. Great Water Alliance - Great Water Alliance shall mean Waukesha Water Utility's program to transition the OWNER's primary source of potable water supply from groundwater to Lake Michigan water consisting of a new water supply system and a new return flow system.

Waukesha Water Utility is hereinafter called OWNER, and the Project has been designed by Greeley and Hansen LLC who is hereinafter called ENGINEER. Black & Veatch Corporation is hereinafter called RESIDENT PROJECT REPRESENTATIVE.

ARTICLE 2 COPIES OF BIDDING DOCUMENTS

- 2.01 Refer to the Notice to Bidders for information on how and where copies of the Bidding Documents may be obtained.
- 2.02 Complete sets of Bidding Documents must be used in preparing Bids; neither OWNER nor ENGINEER assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 OWNER and ENGINEER in making copies of Bidding Documents available do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

ARTICLE 3 QUALIFICATIONS OF BIDDERS

- 3.01 Bidders had to meet the prequalification requirements of the Great Lakes Water Supply Program.

- 3.02 In evaluating Bids, OWNER will consider the qualifications of only those Bidders whose Bids are in compliance with the prescribed requirements.
- 3.03 The Bidder had to be present at the mandatory pre-bid conference as stipulated in the Notice to Bidders.
- 3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications. Bidders must complete and submit the Certification of Debarment, Certification of Nonsegregated Facilities, Non-discrimination in Employment, DBE Participation Certificate, and other Responsibility Matter forms included in the Bidding Documents. A Checklist is included in Article 13.16. Failure to submit any required form shall be deemed incomplete bid package and the Bid shall be rejected by OWNER.

Bidder shall provide with their bid submission:

- A. A complete and comprehensive plan, methodology and sequencing for performing the proposed work. Include and address proposed approach to construction items of work listed herein, including work to be provided by a sub-contractor. Detail shall include a high-level planning schedule with key milestones, number of crews, crew spacing, coordination with trenchless technologies, site logistics planning, etc.
- B. Provide a list of all current employees and their job classification for those employees which would be involved in the proposed project; and provide an organizational chart and identify the key personnel that are anticipated to comprise the management team of this project. Provide resumes for key personnel along with their experience. Key personnel shall possess relative experience in similar work within the past 5-years. Key personnel shall include Foremen, Superintendents, Project Manager, Project Engineer, etc.
- C. Provide a list of all equipment owned by the contractor and available for use on this project.
- D. Provide a list of all Responsible Managing employees (RME) or Responsible Managing Officer (RMO).

ARTICLE 4 EXAMINATION OF BIDDING DOCUMENTS, SITE, AND OTHER RELATED DATA

4.01 Existing Site Conditions

- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by OWNER for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and

equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

- B. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER unless otherwise required in the Bidding Documents.

4.02 Subsurface and Physical Conditions

- A. The Supplementary Conditions identify:
 - 1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Bidding Documents.
 - 2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Bidding Documents.
- B. Copies of reports and drawings referenced in Paragraph 4.02.A of this Article will be made available by OWNER to Quest Construction Data Network (QuestCDN) for download. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 5.03 of the General Conditions has been identified and established in Paragraph SC-5.03 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions or information contained in such reports or shown or indicated in such drawings.

4.03 Underground Facilities

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to OWNER and ENGINEER by owners of such Underground Facilities, including OWNER, or others.

4.04 Hazardous Environmental Condition

- A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that ENGINEER has used in preparing the Bidding Documents.
- B. Copies of reports and drawings referenced in Paragraph 4.03.A of Article 4 will be made available by OWNER through QuestCDN for download. Those reports and drawings are not part of the Contract Documents, but the

“technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 5.06 of the General Conditions has been identified and established in Paragraph SC-5.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

- 4.05 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated or identified in the Contract Documents to be within the scope of the Work appear in Paragraph 5.06 of the General Conditions.
- 4.06 On request, and to the extent OWNER has control over the Site, and schedule permitting, the OWNER will provide Bidder access to the Site to conduct, at their own expense, such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder to comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by OWNER or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- 4.07 Bidder to fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

ARTICLE 5 BIDDER’S REPRESENTATIONS

- 5.01 Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by OWNER or others (such as utilities and other prime contractors) that relates to the Work for which a Bid is to be submitted. Access to digital copies of Contract Documents (other than portions thereof related to price) for such other work will be made available to Bidders upon request.
- 5.02 It is the responsibility of each Bidder before submitting a Bid to:
- A. Examine and carefully study the Bidding Documents, including any Addenda and the other related data identified in the Bidding Documents;

- B. Visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. Become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, or performance of the Work;
- D. Carefully study all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in Paragraph 5.03 of the General Conditions, and carefully study all reports and drawings of a Hazardous Environmental Condition, if any, at the Site which have been identified in the Supplementary Conditions as provided in Paragraph 5.06 of the General Conditions;
- E. Obtain and carefully study (or assume responsibility for doing so) all examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents, and safety precautions and programs incident thereto;
- F. Consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;
- G. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;
- H. Become aware of the general nature of the work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents;

- I. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;
 - J. Promptly give ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Contract Documents and confirm that the written resolution thereof by ENGINEER is acceptable to Bidder, and
 - K. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- 5.03 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 5, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by ENGINEER are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 6 PRE-BID CONFERENCE

- 6.01 A Mandatory pre-bid conference will be held at the time, date, and place indicated in the Notice to Bidders.

Representatives of OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE will be present to discuss the Project. Bidders are required to attend and encouraged to participate in the conference. ENGINEER will transmit to all prospective Bidders of record, such Addenda as ENGINEER compiles as a result of the conference. All questions shall be submitted in writing via email to be considered for response via addenda. Oral statements made during the pre-bid conference are not to be relied upon and will not be binding or legally effective.

ARTICLE 7 INTERPRETATIONS AND ADDENDA

- 7.01 No interpretation of the meaning of the Contract Documents will be made to any Bidder orally. All questions about the meaning or intent of the Bidding Documents are to be directed to ENGINEER in writing via email to gwa@greeley-hansen.com. Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda which, if issued, will be issued through

QuestCDN, not later than seven (7) days prior to the date fixed for the Bid opening. Questions received less than ten (10) days prior to the date for opening of Bids may not be answered.

- 7.02 Written clarifications or interpretations will be issued by Addenda not later than seven (7) days before the bid opening date. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.03 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by OWNER or ENGINEER.
- 7.04 Failure of any Bidder to receive any addenda does not relieve said Bidder from any obligation under the Bid as submitted. All addenda issued become part of the Contract Documents. Bidders are responsible for determining that they have received all addenda issued.

ARTICLE 8 BID SECURITY

- 8.01 Each Bid must be accompanied by Bid Security made payable to OWNER in an amount no less than five (5) percent of Bidder's total maximum bid computed price. The Bid Security shall be in the form of a certified or bank cashier's check or a Bid Bond, on the form attached, issued by a surety meeting the requirements of paragraphs 6.01 of the General Conditions. The Bidder shall upload the executed copy of the bid bond on the QuestCDN. The original bid bond document will then need to be submitted by the Bidder to the Waukesha Water Utility, immediately upon being notified that they are the apparent low bidder.
- 8.02 The bid security of the apparent Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within fifteen (15) days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that Bidder will be forfeited. Such forfeiture shall be OWNER's exclusive remedy if Bidder defaults.
- 8.03 All bids shall remain open for ninety (90) days after the actual date of the opening of the Bids, but the OWNER may, at the OWNER's sole discretion, release any Bid and return the Bid Security prior to that date.
- 8.04 Bid Security of other Bidders whom OWNER believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

ARTICLE 9 CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) Substantially Completed and (b) also completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 SUBSTITUTE AND "OR-EQUAL" ITEMS

- 11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be considered by ENGINEER until after the Effective Date of the Agreement. The procedure for submission of any such application by CONTRACTOR and consideration by ENGINEER is set forth in the General Conditions and may be supplemented in the Supplemental Conditions.

ARTICLE 12 SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 The CONTRACTOR will identify all Subcontractors in its Bid. Any addition to, deletion from, or other change to the list of Subcontractors identified in the CONTRACTOR's Bid may not take place without the advance written approval of the OWNER. The OWNER reserves the right to approve or disapprove of any Subcontractor within five (5) days of being notified that the CONTRACTOR intends to enter into a subcontract. All Subcontractors will be bound by all applicable terms and conditions of the Contract between the OWNER and the CONTRACTOR.

ARTICLE 13 PREPARATION OF BID

- 13.01 All blanks on the Bid Form shall be completed. Basis of Bid shall be completed via Bid Worksheet Tab on QuestCDN and will take precedence over the Basis of Bid table in the Bid Form PDF uploaded on QuestCDN. A Bid price shall be indicated for each Bid item, alternate, and unit price item listed therein.

- 13.02 If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
- 13.03 A Bid which includes for any item a Bid Price that is abnormally low or high may be rejected as unbalanced.
- 13.04 A conditional or qualified Bid will not be accepted.
- 13.05 All names shall be printed in black or blue ink or with typewriter below signatures.
- 13.06 A bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
- 13.07 A bid by a partnership shall be executed in the partnership name and signed by a partner, whose title must appear under the signature, accompanied by evidence of authority to sign. The official address of the partnership shall be shown below the signature.
- 13.08 A bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown below the signature.
- 13.09 A bid by an individual shall show the Bidder’s name and official address.
- 13.10 A bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The official address of the joint venture must be shown below the signature.
- 13.11 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.12 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.13 The Bid shall contain evidence of Bidder’s authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder’s state contractor license number, if any, shall also be shown on the Bid Form.
- 13.14 Certification that the Bidder is not barred from public contracting due to bid-rigging or bid rotation convictions must accompany the Bid.

- 13.15 All Bids shall be signed in the presence of and be notarized by a Notary Public or other Officer authorized to administer oaths.
- 13.16 Attached to the end of this Section is a checklist of items that must be submitted with the Bid.

ARTICLE 14 BASIS OF BID, EVALUATION OF BIDS

14.01 Unit Cost Items

- A. Bidders shall include a separate price for each unit cost item described in the Bidding Documents and as provided for in the Bid Form. Unit cost items may be additive or deductive. If the OWNER elects to add or remove a quantity of a unit cost item from the Contract, the amount will be added to or deleted from the contract amount after execution of the Agreement
- B. Bidders with intention to submit an alternate bid to complete the Work for Contract Package 5 and 6 will include this information with Contract Package 6.

14.02 Lump Sum

- A. Bidders shall submit a Bid on a lump sum basis as set forth in the Bid form.

ARTICLE 15 SUBMITTAL OF BID

- 15.01 A bid shall be submitted on the QuestCDN and bid security and other required documents shall be uploaded on the QuestCDN no later than the time and place indicated in the Notice to Bidders. If a bid is sent by mail or other delivery system, it will not be accepted and returned unopened to the contractor.
- 15.02 Each Bidder shall accompany their Bid with a sworn statement in writing that the Bidder had not directly or indirectly entered into an agreement, expressed or implied, with any other Bidder concerning the price or amount of such Bid or any Bids, the limiting of the Bid or Bidders, the paying to anyone any money for promotion expenses, the parceling or farming out to any Bidder or Bidders or other persons of any party of the contract or any part of the subject matter of the Bid or of the profits thereof. Each Bidder shall upload the sworn statement on the QuestCDN.

ARTICLE 16 MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and updated on the QuestCDN to the scheduled date and time (or authorized postponement thereof) for the opening of Bids.
- 16.02 If, within 24 hours after Bids are opened, any Bidder files a duly signed, written notice with OWNER and promptly thereafter demonstrates to the reasonable

satisfaction of OWNER that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid and the Bid security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents. After the 24 hour period after Bids are opened, no Bid may be withdrawn for a period of ninety (90) days after the actual date of the opening of the Bids.

- 16.03 Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the Bidder.

ARTICLE 17 INDEMNIFICATION

- 17.01 The Contractor will save, indemnify and hold harmless the OWNER against all claims, liability, judgments, costs, expenses, and attorney's fees of any kind whatsoever which may in any way come against the OWNER as a consequence of the granting of the Contract, or by reason of any act or omission of the Contractor or the Contractor's agents, employees, subcontractors, or assignees, arising out of the performance of the Contract.

ARTICLE 18 OPENING OF BIDS

- 18.01 The Bid opening is open to the public. The Bid Proposals shall be read aloud by the OWNER. The successful Bidder shall be notified at the earliest possible date in writing by the OWNER following approval by the City of Waukesha Common Council.
- 18.02 The OWNER reserves the right to reject any or all Bids or to waive any informalities and to accept the bid which it deems most favorable to the interests of the OWNER, after all bids have been examined and canvassed.

ARTICLE 19 BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 19.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but OWNER may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 20 AWARD OF CONTRACT

- 20.01 The Contract will be awarded to the low, responsive, responsible Bidder.
- A. In evaluating Bids, OWNER will consider whether or not the Bids comply with the prescribed requirements, and such unit prices and other data, as may be requested in the Bid Form. Responsive Bidders shall provide Bids for all

requested unit or lump sum prices for each item set forth on the Bid Form. Any Bid which contains blank items will be considered unresponsive.

- B. The term “low, responsive, responsible Bidder” as used herein shall mean the Bidder whose Bid is the lowest of those Bidders possessing the skill, ability and integrity necessary to the faithful performance of the Work and submits a Bid meeting all requirements. The OWNER reserves the right to reject any or all Bids or to waive any informalities and to accept the bid which it deems most favorable to the interests of the OWNER, after all bids have been examined and canvassed.
- C. The low Bid will be determined based on the Bidder's total maximum bid price amount listed in the Bid Form.
- D. OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals or entities to perform the Work in accordance with the Contract Documents to OWNER’s satisfaction within the prescribed time. Bidder shall furnish to OWNER all such information and data for this purpose as OWNER may request. OWNER reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy OWNER that such Bidder is properly qualified to carry out the obligations of the Contract Documents and to complete the work contemplated therein.
- E. More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- F. In evaluating Bidders, OWNER will consider the qualifications of Bidders and may consider the qualifications and experience of proposed Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as described in the Supplementary Conditions.
- G. OWNER may conduct such investigations as OWNER deems necessary to establish the responsibility, qualifications and financial ability of Bidders to perform the Work in accordance with the Contract Documents.

20.02 The Contract will be awarded on the basis of material and equipment described in the Contract Documents without consideration of possible substitute or “or equal” items. Whenever it is indicated in the Contract Documents that a substitute or “or equal” item of material or equipment may be furnished or used by the Bidder, if acceptable to the ENGINEER, application for such acceptance will not be

considered by the ENGINEER until after the “effective date of the Agreement.” The procedure for submittal of any such application by the Bidder and consideration by the ENGINEER is set forth in Section 01 60 00 of the Contract Document.

- 20.03 The award of the Contract is contingent upon the OWNER securing the requested loan from a combination of the Environmental Protection Agency (EPA) Water Infrastructure Finance and Innovation Act (WIFIA) program and the Wisconsin Department of Natural Resources (WDNR) Clean Water Fund Program (CWFP) within ninety (90) days of the Bid opening.
- 20.04 If the Contract is to be awarded, after evaluation of the Bids, the OWNER will issue a letter to the Successful Bidder. OWNER will give the Successful Bidder a Notice of Award within ninety (90) days after the actual date of the opening of the Bids. All bids shall remain open for ninety (90) days after the actual date of the opening of the Bids, but the OWNER may, at the OWNER’s sole discretion, release any Bid and return the Bid Security prior to that date.

ARTICLE 21 CONTRACT SECURITY AND INSURANCE

- 21.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth OWNER's requirements as to Performance and Payment Bonds and insurance. When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by such Bonds and proof of insurance.
- 21.02 A Performance Bond and a Payment Bond, each in the amount of one hundred percent (100%) of the Contract Price, with a corporate surety approved by the OWNER will be required.
- 21.03 Attorneys-in-fact who sign Payment Bonds and Performance Bonds must file with each Bond.

ARTICLE 22 SIGNING OF AGREEMENT

- 22.01 When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement attached thereto. Within fifteen (15) days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to OWNER with the required Bonds and insurance. Within thirty (30) days of the OWNER’s receipt of the CONTRACTOR’s signed agree thereafter, OWNER shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings.

ARTICLE 23 SAFETY AND HEALTH REGULATIONS

- 23.01 This project is subject to the Safety and Health Regulations (CFR 29, Part 1926 and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974 and CFR 29, Part 1910, General Industry Safety and Health Regulations Identified as Applicable to Construction.
- 23.02 The Successful Bidder shall comply with the Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 (PL-91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL-91-54).
- 23.03 The Successful Bidder shall have a competent person or persons, as required under the Occupational Safety and Health Act, on the Site to inspect the work and to supervise the conformance of the Work with the regulations of the Act.

ARTICLE 24 NONDISCRIMINATION IN EMPLOYMENT

- 24.01 Contracts for Work under this Project will obligate the CONTRACTOR and Subcontractors to not discriminate in employment practices.
- 24.02 The CONTRACTOR shall certify that the firm, partnership, corporation, or joint venture has a written sexual harassment policy defining sexual harassment as required in Section 111.321 Subchapter II Fair Employment of the Wisconsin State Statutes.

ARTICLE 25 SALES AND USE TAXES

- 25.01 OWNER is exempt from payment of Wisconsin State Sales and Use Taxes on all materials and equipment to be incorporated into the Work (Exemption No. 2678). Said taxes shall not be included in the Contract Price. Refer to Paragraph SC-7.09 of the Supplementary Conditions for additional information.
 - A. OWNER will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the work.

ARTICLE 26 RETAINAGE

- 26.01 Provisions concerning retainage and CONTRACTORS' rights to deposit securities in lieu of retainage are set forth in the Agreement.

ARTICLE 27 WISCONSIN DNR LOAN PROGRAM RELATED PROCUREMENT REQUIREMENTS

- 27.01 Bidders shall submit with their Bid a “Certificate of Publication” and/or adequate evidence of proof of publication including actual copy of the newspaper advertisement from the nation-wide newspaper. Advertisement must run for one (1) consecutive day at least thirty (30) days prior to the Bid opening.
- 27.02 Any contract entered into by the Loan recipient and any subagreement thereunder, shall provide that representatives of the WDNR and any other state, county, or local agencies will have access to the work whenever it is in preparation or progress and that the Bidder will provide proper facilities for such access and inspection. Such contract or subagreement must also provide that the WDNR or any authorized representative shall have access to any books, documents, papers, and records of the contractor or subcontractor which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcriptions thereof.
- 27.03 All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the contract throughout.

ARTICLE 28 WISCONSIN DNR LOAN PROGRAM RELATED TO AMERICAN IRON AND STEEL REQUIREMENTS

- 28.01 The Bidder acknowledges to and for the benefit of Waukesha Water Utility and the State of Wisconsin that it understands the goods and services under this Agreement are being funded with monies made available by the WIFIA program and the CFWP that have statutory requirements commonly known as “American Iron and Steel;” that requires all of the iron and steel products used in the project to be produced in the United States (“American Iron and Steel Requirement”) including iron and steel products provided by the Bidder pursuant to this Agreement.
- 28.02 The Bidder hereby represents and warrants to and for the benefit of the OWNER and the State that (a) the Bidder has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, and (c) the Bidder will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the OWNER or the State.
- 28.03 Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Bidder shall permit the OWNER or State to recover as damages against the Bidder any loss, expense, or cost (including without limitation attorney’s fees) incurred by the OWNER or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the OWNER). While

the Bidder has no direct contractual privity with the State, as a lender to the OWNER for the funding of its project, the OWNER and the Bidder agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

WAUKESHA WATER UTILITY

CONTRACT PACKAGE 5

Bidder's Checklist of Items to Assist with Bid Submittal

1. Bid Security (Cashier's Check, Certified Check or Bid Bond): 5% of the Bid (Attach to last page of Bid Form - Section 00 41 00)
2. Completed Bid Form Section - Section 00 41 00:
 - a. All names filled in appropriate blanks.
 - b. Acknowledge receipt of Addenda.
 - c. Price Schedule filled out.
 - d. List of Subcontractors.
 - e. List of Project References.
 - f. List of Proposed Suppliers.
 - g. Bid Signed by Officers.
 - a. Bidder Information
 - i. A complete and comprehensive plan, methodology and sequencing for performing the proposed work.
 - ii. Provide a list of all current employees and their job classification for those employees.
 - iii. Provide a list of all equipment owned by the contractor and available for use on this project.
 - iv. Provide a list of all Responsible Managing employees (RME) or Responsible Managing Officer (RMO).
3. Complete Certification of Debarment Section - Section 00 32 00
4. Disadvantaged Business Enterprise (DBE) and Local Business Participation (Waukesha Water Utility Requirements) – Section 00 73 39
5. Certification of Non-Segregated Facilities Section - Section 00 82 30
6. Notice to Labor Unions or Other Organizations of Workers - Nondiscrimination in Employment – Section 00 82 40
7. Disadvantaged Business Enterprise (DBE) Participation - Section 00 82 50
 - a. If no subcontracts will be awarded, the Bidder submits page 7.
 - b. Complete Data Sheet #1, Page 11 through Page 13
 - c. Submit Certificate of Publication for 1 day at least 30 days prior to bid opening. Attach to page 15.
 - d. If using a SBE, MBE and/or WBE, each subcontractor completes page 17. Make additional copies, as needed.

- e. If using a SBE, MBE and/or WBE, the Bidder completes page 19 and 21.
- f. If not using SBE, MBE and/or WBE, the Bidder submits page 23.

END OF SECTION

SECTION 00 32 00

CERTIFICATION OF DEBARMENT

Certification Regarding
Debarment, Suspension and Other Responsibility Matters

The prospective participant to the best of its knowledge and belief that it and its principles:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification;
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default; and
- (e) Have not knowingly entered into a contract with anyone who is ineligible under the 2 CFR Part 180 and Part 1532 to participate in the Project (suspension and debarment information can be accessed at <http://www.sam.gov>) and represents and warrants that it has or will include a term or conditions requiring compliance with this provision in all of its subcontracts under this Agreement.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in fine of up to \$10,000 or imprisonment for up to 5 years, or both.

(Typed Name & Title of Authorized Representative)

(Signature of Authorized Representative)

(Date)

☐ I am unable to certify the above statements. My explanation is attached.

EPA FORM 5700-49 (11-88)

END OF SECTION

SECTION 00 41 00

BID FORM

Proposal of _____ (hereinafter called "Bidder"), organized and existing under the laws of the State of _____ doing business as _____ *

to the Waukesha Water Utility, Waukesha, Wisconsin (hereinafter called "OWNER").

* Insert "an individual", "a firm", "a partnership", "a corporation", or "a joint venture" as applicable.

In compliance with your Notice to Bidders, Bidder hereby proposes to perform all Work for the construction of the Contract Package 5 Project in strict accordance with the CONTRACT DOCUMENTS, within the time set forth herein, and at the prices stated below.

Bidder hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED, to substantially and fully complete the PROJECT within the times specified in the AGREEMENT.

ARTICLE 1 – BID RECIPIENT AND BIDDER’S INFORMATION

1.01 This Bid is submitted to the Waukesha Water Utility.

1.02 The undersigned Bidder proposes and agrees, if this bid is accepted, to enter into an agreement with the OWNER in the form of the CONTRACT DOCUMENTS to perform and furnish all Work as specified or indicated in the CONTRACT DOCUMENTS for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the CONTRACT DOCUMENTS.

Date of Bid _____

Made by _____

Name of Bidder _____
(Individual, firm, partnership, corporation, or joint venture as case may be)

Business Address of Bidder _____

Bidder's Telephone Number _____

Bidder's Fax Number _____

Residence Address of Bidder (If an individual) _____

(If Bidder is a firm, fill in the names and addresses of all partners in the following blanks)

Names of Partners	Addresses of Partners
_____	_____
_____	_____
_____	_____
_____	_____

(If Bidder is a corporation, fill in the following blanks):

Organized under the laws of the State of _____

Name and Address of President _____

Name and Address of Vice President _____

Name and Address of Secretary _____

Name and Address of Treasurer _____

(If the Bidder is a joint venture, fill in the following blanks):

Made by _____

Name of Bidder _____
(Individual firm or corporation as the case may be)

Place of Business of Bidder _____

Made by _____

Name of Bidder _____
(Individual firm or corporation as the case may be)

Place of Business of Bidder _____

Made by _____

Name of Bidder _____
(Individual firm or corporation as the case may be)

Place of Business of Bidder _____
(Each joint venture member must be listed whether individual, firm, partnership, corporation, or joint venture)

ARTICLE 2 – ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

- 2.01 Bidder accepts all of the terms and conditions of the Notice to Bidders and Instructions to Bidders, including without limitation those dealing with the disposition of the Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

- 3.01 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:
- A. BIDDER has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged:

Addendum No.	Dated

- B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface of subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 5.03 of the General Conditions. Bidder accepts the determination set forth in paragraph SC-5.03 and SC-5.06 of the Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which BIDDER is entitled to rely as provided in paragraph 5.03 and 5.06 of the General Conditions. BIDDER acknowledges that such reports and drawings are not Contract Documents and may not be complete for Bidder's purposes. BIDDER acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the site.
- E. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site or otherwise which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.
- F. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; all additional examinations, investigations, explorations, tests, studies and data with the Bidding Documents, and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

- G. Bidder does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- H. Bidder is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.
- I. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by ENGINEER is acceptable to Bidder.
- J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance of the Work for which this Bid is submitted.
- K. Bidder is not in arrears to the OWNER, upon debt or contract; is not a defaulter, as surety or otherwise, upon any obligation to the OWNER; and has not been delinquent or unfaithful in any former contract with the OWNER.
- L. That no officer or employee or person whose salary is payable in whole or in part by the OWNER is, shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this Bid, or in the performance of the Contract, or in the supplies, materials, or equipment and Work or labor to which it relates, or in any portion of the profits thereof.
- M. All bids are based on named manufacturers for principal equipment items as listed in the Bid Form.
- N. That the Bidder
 ___ Has)
) Check applicable box
 ___ Has not)
- previously performed Work under the President's Executive Order No. 11246 as amended.
- O. Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

ARTICLE 4 – BIDDER’S CERTIFICATION

4.01 By submission of the Bid, each Bidder certifies, and in the case of a joint bid each party thereto certifies as to their own organization, that in connection with the Bid:

- A. The prices in the Bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other Bidder or with any competitor;
- B. Unless otherwise required by law, the prices which have been quoted in the bid have not knowingly been disclosed by the Bidder, prior to opening, directly or indirectly to any other Bidder or to any competitor; and
- C. No attempt has been made or will be made by the Bidder to induce any other person or firm to submit or not to submit a Bid for the purpose of restricting competition.
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this paragraph:
 - 1. “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
 - 2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of OWNER, (b) to establish Bid prices at artificial non-competitive levels, or (c) to deprive OWNER of the benefits of free and open competition;
 - 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of OWNER, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 - 4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

4.02 Each person signing the bid shall certify that:

- A. They are the person in the Bidder’s organization responsible within that organization for the decision as to the prices being Bid and that they have not participated, and will not participate, in any action contrary to Paragraph 4.01 Subsection A through Subsection C above; or
- B. They are not the person in the Bidder’s organization responsible within that organization for the decision as to the prices being bid but that they have been authorized to act as agent for the persons responsible for such decision in certifying that such person have not participated, and will not participate, in any action contrary to Paragraph 4.01 Subsection A through Subsection C above, and

as their agent shall so certify; that they have not participated, and will not participate, in any action contrary to Paragraph 4.01 Subsection A through Subsection C above.

ARTICLE 5 – STATE LOAN CERTIFICATIONS

Each person signing the Bid certifies to the following State Loan requirements:

5.01 NON-DISCRIMINATION IN EMPLOYMENT

- A. The Bidder will comply with Title VI of the Civil Rights Act (P.L. 88-352), which provides that no person shall on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.
- B. The Bidder will comply with the Clean Water Act, Section 13 (P.L. 92-500), which provides that no person shall on the basis of sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.
- C. The Bidder will comply with the Age Discrimination Act (P.L. 94-135), which prohibits, with certain exceptions, discrimination on the basis of age in programs or activities receiving federal financial assistance.
- D. The Bidder will comply with Section 504 of the Rehabilitation Act (P.L. 93-112) Supplemented by Executive Orders 11914 and 11250, which provides that no otherwise qualified individual with a disability shall solely by reason of their disability, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.
- E. The Bidder will comply with Equal Employment Opportunity Requirements, Executive Order 11246, which requires that a contractor under a federal or federally assisted construction project not discriminate in employment on the basis of race, color, religion, sex, or national origin. The Order requires contractors to take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Further, it requires the contractor to post all mandatory equal opportunity notices and complete all required Department of Labor and Equal Opportunity Commission reporting forms. Refer to Section 00 82 40 for Notice to Labor Unions or Other Organizations of Workers on Non-Discrimination in Employment.

5.02 DEBARMENT AND SUSPENSION REQUIREMENTS

- A. The Bidder will comply with Debarment and Suspension Requirements, Executive Order 12549, which requires recipients, contractors, and subcontractors to provide certifications that they will not knowingly enter into contracts with individuals or businesses which have been debarred or suspended from federal assistance programs.

5.03 DISADVANTAGED BUSINESS ENTERPRISES

- A. The Bidder will comply with 40 CFR Part 33, Participation by Disadvantaged Business Enterprises in Procurement under Environmental Protection Agency (EPA) Financial Assistance Agreements.

5.04 FEDERAL LOBBYING RESTRICTIONS

- A. Recipients of federal financial assistance may not pay any person for influencing or attempting to influence any officer or employee of a federal agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress with respect to the award, continuation, renewal, amendment, or modification of a federal grant, loan, or contract. These requirements are implemented for USEPA in 40 CFR Part 34, which also describes types of activities, such as legislative liaison activities and professional and technical services, which are not subject to this prohibition.
- B. Upon award of this contract, Contractor shall complete and submit to the City the certification and disclosure forms in Appendix A and Appendix B to 40 CFR Part 34. Contractor shall also require all subcontractors and suppliers of any tier awarded a subcontract over \$100,000 to similarly complete and submit the certification and disclosure forms pursuant to the process set forth in 40 CFR 34.110.

5.05 ALCOHOL AND DRUG FREE WORKPLACE

- A. The Bidder will comply with the Drug-Free Workplace Act, (P.L. 100-690), which requires contractors and grantees to agree that they will provide a Drug-Free Workplace. The Bidder agrees that they operate a drug free environment and that drugs are not allowed in the workplace or satellite locations as well as Waukesha Water Utility project locations in accordance with s. 66.0903 (4), 2013 stats., or s. 16.856 (2m), 2015 stats.
- B. The Bidder has a written substance abuse prevention program meeting the requirements of Wisconsin s. 103.503. As required by Wisconsin s. 103.503, all employees are subject to drug and alcohol testing before commencing work on public works projects, except that testing of an employee before commencing work on a project is not required if the employee has been participating in a random testing program during the 90 days preceding the date on which the employee commence work on the public works project.

5.06 COMPLIANCE WITH DAVIIS BACON AND RELATED ACTS

A. In any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public work, or building or work financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in 29 C.F.R. § 5.1, the following clauses (or any modifications thereof to meet the particular needs of the agency, provided that such modifications are first approved by the Department of Labor):

1. Minimum Wages

- a. All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- 1) The WIFIA assistance recipient, OWNER, on behalf of the EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The WIFIA assistance recipient shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
 - i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - ii) The classification is utilized in the area by the construction industry; and
 - iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- 2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the WIFIA assistance recipient agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent to the Administrator of the Wage and Hour Division (WHD Administrator), U.S. Department of Labor, Washington, DC 20210. The WHD Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the WIFIA assistance recipient or will notify the WIFIA assistance recipient within the 30-day period that additional time is necessary.
- 3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the WIFIA assistance recipient do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the WIFIA assistance recipient shall refer the questions, including the views of all interested parties and the recommendation of the WIFIA assistance recipient, to the WHD Administrator for determination. The WHD Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the WIFIA assistance recipient or will notify the WIFIA assistance recipient within the 30-day period that additional time is necessary.
- 4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the

classification under this contract from the first day on which work is performed in the classification.

- b. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
 - c. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.
2. Withholding. OWNER shall upon written request of the WIFIA Director or an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the WIFIA Director may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.
3. Payrolls and basic records
- a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual

wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

- 1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to OWNER. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division [Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm](http://www.dol.gov/esa/whd/forms/wh347instr.htm) or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to [name of WIFIA borrower], for transmission to the EPA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to [name of WIFIA borrower].
- 2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
 - i) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of

Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

- ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
 - iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- 3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by paragraph (a)(3)(ii)(B) of this section.
 - 4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
- b. The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of [name of the borrower, EPA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the EPA may, after written notice to the [name of WIFIA borrower], take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.
4. Apprentices and trainees
- a. Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such

an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the WHD Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- b. Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions

of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the WHD Administrator determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
6. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and [name of

WIFIA borrower], EPA, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

- a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

B. Contract Work Hours and Safety Standards Act. The following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section shall be inserted in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by § 5.5(a) or § 4.6 of part 4 of this title. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$25 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.
3. Withholding for unpaid wages and liquidated damages. The [name of WIFIA borrower] shall upon its own action or upon written request of an authorized representative of the Department of Labor, or the EPA, withhold or cause to be withheld, from any moneys payable on account of work

performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.
- C. In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in § 5.1, the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the EPA shall cause or require the [name of WIFIA borrower] to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the [name of WIFIA borrower], EPA and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5.07 USE OF AMERICAN IRON AND STEEL

- A. The Contractor acknowledges to and for the benefit of the OWNER and the EPA that it understands the goods and services under this Agreement are being funded with monies made available by the Water Infrastructure Finance and Innovation Act program of the EPA that has statutory requirements commonly known as “American Iron and Steel” that requires all of the iron and steel products used in the project to be produced in the United States (“American Iron and Steel Requirement”) including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents, warrants and covenants to and for the benefit of the Purchaser and the EPA that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information,

certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the EPA. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or the EPA to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or the EPA resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the EPA or any damages owed to the EPA by the Purchaser). While the Contractor has no direct contractual privity with the EPA, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the EPA is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the EPA.

5.08 COMPLIANCE WITH SAFETY REGULATIONS

- A. The Bidder is fully aware of and able to comply with all Local, State, and Federal Safety and other Laws, Codes, and Regulations applicable for the construction the Project.

ARTICLE 6 – BASIS OF BID

Bidder will complete the Work in accordance with the Contract Documents for the following prices:

CONTRACT ITEM			UNIT	ESTIMATED QUANTITY	UNIT PRICE	COMPUTED TOTAL PRICE FOR ITEM
1	Mobilization and Demobilization (4 Percent of Total Computed Price)		LS	1	\$	\$
2	Maintenance of Traffic		LS	1	\$	\$
3	Ductile Iron Return Flow Pipeline (Open Cut)					
	3A	30-Inch, Common Fill	LF	14,053	\$	\$
	3B	30-Inch, Select Fill	LF	18,535	\$	\$
	3C	30-Inch, Flowable Fill	LF	13,282	\$	\$
4	36-Inch HDPE Return Flow Pipeline (Horizontal Directional Drilling)		LF	5,198	\$	\$
5	Ductile Iron Return Flow Pipeline in Steel Casing (Jacking and Boring)					
	5A	30-Inch, Road	LF	681	\$	\$
	5B	30-Inch, Sentry Dr. and Canadian National Railroad	LF	187	\$	\$
	5C	30-Inch, Sunset Dr. and Canadian National Railroad	LF	263	\$	\$

CONTRACT ITEM			UNIT	ESTIMATED QUANTITY	UNIT PRICE	COMPUTED TOTAL PRICE FOR ITEM
6	Butterfly Valves					
	6A	30-Inch, Direct Buried	EA	6	\$	\$
	6B	30-Inch, In Vault	EA	4	\$	\$
	6C	30-Inch, In Vault with Pressure Transmitter	EA	1	\$	\$
	6D	Process Control System Integration	LS	1	\$	\$
7	Air Valve Assemblies					
	7A	Type I	EA	8	\$	\$
	7B	Type II	EA	5	\$	\$
8	Blow-Off Assemblies		EA	8	\$	\$
9	Cathodic Protection		LS	1	\$	\$
10	Base Course		TON	18,719	\$	\$
11	Road Pavement					
	11A	Asphalt	TON	1,979	\$	\$
	11B	8-Inch Concrete	SY	6,820	\$	\$
	11C	9-Inch Concrete	SY	67	\$	\$

CONTRACT ITEM			UNIT	ESTIMATED QUANTITY	UNIT PRICE	COMPUTED TOTAL PRICE FOR ITEM
	11D	10-Inch Concrete	SY	7,175	\$	\$
	11E	Mill and Overlay	SY	17,811	\$	\$
12	Final Pavement Markings		LS	1	\$	\$
13	Curb and Gutter		LF	1,568	\$	\$
14	Pedestrian Pavement					
	14A	Asphalt	TON	623	\$	\$
	14B	Concrete Sidewalk	SY	125	\$	\$
15	Driveway Pavement					
	15A	Asphalt	TON	38	\$	\$
	15B	Concrete	SY	664	\$	\$
16	Erosion and Sedimentation Control		LS	1	\$	\$
17	Landscape, Wetland, and Agricultural Restoration		SY	13,165	\$	\$
18	Disposal of Impacted Soil and Groundwater		TON	3,438	\$	\$
19	HDPE Conduit for Fiber Optic Communication					
	19A	HDPE Conduit	LF	10,000	\$	\$

CONTRACT ITEM			UNIT	ESTIMATED QUANTITY	UNIT PRICE	COMPUTED TOTAL PRICE FOR ITEM
	19B	Polymer-Concrete Handholes	EA	5	\$	\$
20	Additional Quantities					
	20A	Earth Excavation	CY	1,000	\$	\$
	20B	Rock Excavation	CY	220	\$	\$
	20C	Select Fill	CY	1,000	\$	\$
	20D	Flowable Fill	CY	1,000	\$	\$
	20E	Pipe Bedding	CY	1,000	\$	\$
	20F	Class D Concrete Encasement	CY	500	\$	\$
	20G	Geotextile Fabric	SF	10,000	\$	\$
	20H	Polystyrene Insulation	SF	2,000	\$	\$
	20I	Groundwater Barriers	EA	10	\$	\$
21	Landscape Restoration within I-43 Right-of-Way		LS	1	\$	\$
22	Resident Project Representative's Field Trailer					
	22A	Resident Project Representative's Field Trailer	LS	1	\$	\$
	22B	One Additional Month of Resident Project	EA	6	\$	\$

CONTRACT ITEM			UNIT	ESTIMATED QUANTITY	UNIT PRICE	COMPUTED TOTAL PRICE FOR ITEM
		Representative's Field Trailer Operation and Maintenance				
A	Allowance Items					
	A1	Disposal of Unforeseen Impacted Materials, Soil	-	-	-	\$ 100,000
	A2	Disposal of Unforeseen Impacted Materials, Groundwater	-	-	-	\$ 50,000
	A3	Unforeseen Landscape, Wetland, and Agricultural Restoration	-	-	-	\$ 20,000

TOTAL COMPUTED PRICE FOR CONTRACT PACKAGE 5:

Amount in Words:

Amount in Figures:

Bidder may present alternates to the Base Bid in writing below, including proposed alternate plan and proposed subtraction from the Base Bid Price. Owner has no obligation to accept the offering of alternates and its corresponding subtraction from the Base Bid. The selection of the successful Bidder will be based upon the Base Bid Price along with a detailed review of Bidder's qualifications to complete the Work presented in the Contract Documents. The alternates may be considered by the Owner after Award of the Contract to the successful Bidder.

[illegible]

Unit Prices have been computed in accordance with paragraph 13.03 of the General Conditions.

Bidder acknowledges that quantities are not guaranteed and final payment will be based on actual quantities determined as provided in the Contract Documents.

The Bidder affirms that the bid is based on the manufacturers below whose names are circled. The award of the Contract will be based on the equipment circled below and no changes to the equipment manufacturers after award will be permitted unless consent is obtained from the ENGINEER.

EQUIPMENT ITEM	BID MANUFACTURER (Circle one per specification section)
Section 33 05 53 High Density Polyethylene Pipe	Chevron Phillips Chemical Company LP, Performance Pipe JM Eagle, Inc. WL Plastics
Section 33 05 55 Ductile Iron Pipe	AMERICAN McWane, Inc. United States Pipe and Foundry Company
Section 40 05 20 Gate Valves	AMERICAN Flow Control Clow Valve Company Kennedy Valve Company Mueller Water Products, Inc. United States Pipe and Foundry Company
Section 40 05 20 Butterfly Valves	DeZURIK, Inc. Kennedy Valve Company M&H Valve Company Mueller Water Products, Inc. Val-Matic Valve & Mfg.

ARTICLE 7 – TIME OF COMPLETION

- 7.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within the number of calendar days indicated in the Agreement.
- 7.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified.

ARTICLE 8 – ATTACHMENTS TO THIS BID

- 8.01 The following documents are submitted with and made a part of this Bid:
- A. Required Bid Security in the amount of five percent (5%) of the bid in the form of a certified check, a bank cashier's check, or a Bid Bond on the attached form. The Bid Security will be retained or returned in accordance with Article 8 of the Instructions to Bidders;
 - B. List of Proposed Subcontractors;
 - C. Evidence of authority to do business in the state of Wisconsin; or a written covenant to obtain such license within the time for acceptance of Bids;
 - D. Required Certifications;
 - E. Evidence of Disadvantaged Business Enterprise (DBE) Participation; and,
 - F. Evidence of Notice to Labor Unions or Other Organizations of Workers – Nondiscrimination in Employment.
 - G. Bidder Information
 - 1. A complete and comprehensive plan, methodology and sequencing for performing the proposed work.
 - 2. Provide a list of all current employees and their job classification for those employees.
 - 3. Provide a list of all equipment owned by the contractor and available for use on this project.
 - 4. Provide a list of all Responsible Managing employees (RME) or Responsible Managing Officer (RMO).

ARTICLE 9 – DEFINED TERMS

- 9.01 The terms used in this Bid which are defined in the General Conditions or Instructions to Bidders will have the meanings indicated in the General Conditions or Instructions to Bidders.

ARTICLE 10 – BID SUBMITTAL

Accompanying this Bid is a certified check, a bank cashier's check
or a Bid Bond on the _____

(Name of Bank or Surety)
of _____
(City and State)
for the sum of _____
_____ Dollars (\$ _____),

which check shall become the property of the Waukesha Water Utility, or which bond shall become forthwith due and payable to the Waukesha Water Utility, if this Bid shall be accepted by the Waukesha Water Utility and the undersigned bidder shall fail to execute a contract with and to furnish the required Performance and Payment Bonds and insurance to the Waukesha Water Utility within 15 days after the date of a written notice by the Waukesha Water Utility to the undersigned bidder so to do.

IN WITNESS WHEREOF, this Bid is hereby signed and sealed as of the date indicated.

Bidder:
Date: _____ By: _____

Printed name of signer

Title of signer

Where Bidder is a Corporation, add:

(SEAL) ATTEST: _____
Secretary

Where Bidder is a Joint Venture, each member of the Joint Venture must sign the Bid.

The bid must be sworn to by the person signing the bid in one of the following forms:

(Form of affidavit where Bidder is an individual)

STATE OF)
) SS:
COUNTY OF)

_____, being duly sworn, deposes and says: That I am the person described in and who executed the foregoing Bid and that the several matters therein stated are in all respects true.

(Signature)

Subscribed and sworn to before me this _____
day of _____, 20____.

Notary Public _____ County

(SEAL)

My Commission expires:

(Form of affidavit where Bidder is a firm)

STATE OF)
) SS:
COUNTY OF)

_____, being duly sworn,

deposes and says: That I am a member of _____

_____ the firm described in and which executed the foregoing Bid; that I duly subscribed the name of the firm thereunto on behalf of the firm; and that the several matters therein stated are in all respects true.

(Signature)

Subscribed and sworn to before me this _____
day of _____, 20__.

Notary Public _____ County

(SEAL)

My Commission expires:

(Form of affidavit where Bidder is a corporation)

STATE OF)
) SS:
COUNTY OF)

_____ and _____
being duly sworn, depose and say: That we reside in the Cities of

_____ and
_____, respectively;

that we are the _____ and
_____, respectively;

of _____
the corporation described in and which executed the foregoing instrument; that we know the
seal of the corporation; that the seal affixed to this instrument is such corporate seal and was
so affixed by order of the Board of Directors of the corporation; that we signed our names
thereto by like order; and that we have knowledge of the several matters therein stated and
they are in all respects true.

(Signature) (Signature)

Subscribed and sworn to before me this _____
day of _____, 20____.

Notary Public _____ County

(SEAL)

My Commission expires:

(Form of Affidavit where Bidder is a Joint Venture)

STATE OF)
) SS:
COUNTY OF)

Name: _____

Firm: _____

Name: _____

Firm: _____

Name: _____

Firm: _____

and

Name: _____

Firm: _____

being duly sworn, depose and say: That we are members of the joint venture described in and which executed the foregoing Bid; that we duly subscribed the names of the firms forming the joint venture thereunto on behalf of each firm and that the several matters therein stated are in all respects true.

(Signature)

(Signature)

(Signature)

(Signature)

Subscribed and sworn to before me this _____
day of _____, 20____.

Notary Public _____ County

(SEAL)

My Commission expires:

SUBCONTRACTED WORK FORM

1. Each subcontractor performing more than 2.5% of the Work and all subcontractors that are utilized to meet the DBE and Local Business requirement must be listed.
2. Changes to Subcontractors may not be made after this form is submitted.

Subcontractor/Work Description	Dollar Amount	Dollar Amount (DBE Firm)*	Dollar Amount (Local Business)*
Total Amount, \$			

* If the Work does not apply to DBE and/or Local Business participation, leave them blank.

Total Contract Amount, \$	
Percentage of Total Contract Amount Subcontracted to DBE Firm(s), %	
Percentage of Total Contract Amount Subcontracted to Local Business(es), %	

END OF SECTION

ATTACH BID SECURITY IN FORM OF A
BANK CASHIER'S CHECK OR CERTIFIED
CHECK AFTER THIS PAGE

(NO TEXT FOR THIS PAGE)

SECTION 00 43 00

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned, _____
_____ as Bidder, and
_____ as Surety, are hereby held and firmly bound unto
Waukesha Water Utility as OWNER in the penal sum of
_____ for the payment of which, well and
truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.
Signed, this _____ day of _____, 20____. The Condition of the above
obligation is such that whereas the Bidder has submitted to the Waukesha Water Utility a
certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing,
for _____.

NOW, THEREFORE,

- (a) If said Bid shall be rejected, or
- (b) If said BID shall be accepted and the Bidder shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for their performance of said contract, and for payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Bidder and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Bidder (L.S.)

Surety

By: _____

IMPORTANT-Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

END OF SECTION

SECTION 00 45 49

USE OF AMERICAN IRON AND STEEL (UAIS) REQUIREMENT

ARTICLE 1 USE OF AMERICAN IRON AND STEEL (UAIS)

Use of American Iron and Steel

Per H.R. 3547, "Consolidated Appropriations Act, 2014"

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term 'iron and steel products' means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the 'Administrator') finds that-

(1) applying subsection (a) would be inconsistent with the public interest;

(2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

(d) This section shall be applied in a manner consistent with United States obligations under international agreements.

(e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out the provisions described in subsection (a)(1) for management and oversight of the requirements of this section.

(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

A guidance document issued by USEPA is available on their website at <https://www.epa.gov/cwsrf/state-revolving-fund-american-iron-and-steel-ais-requirement>.

ARTICLE 2 IRON AND STEEL PRODUCTS

Below is a listing of products covered under the UAIS requirement. It is not intended to be comprehensive, but rather a guide.

- Lined or unlined pipes or fittings;
- Manhole Covers;
- Municipal Castings
 - Access Hatches;
 - Ballast Screen;
 - Benches (Iron or Steel);
 - Bollards;
 - Cast Bases;
 - Cast Iron Hinged Hatches, Square and Rectangular;
 - Cast Iron Riser Rings;
 - Catch Basin Inlet;
 - Cleanout/Monument Boxes;
 - Construction Covers and Frames;
 - Curb and Corner Guards;
 - Curb Openings;
 - Detectable Warning Plates;
 - Downspout Shoes (Boot, Inlet);
 - Drainage Grates, Frames and Curb Inlets;
 - Inlets;
 - Junction Boxes;
 - Lampposts;
 - Manhole Covers, Rings and Frames, Risers;
 - Meter Boxes;
 - Service Boxes;
 - Steel Hinged Hatches, Square and Rectangular;
 - Steel Riser Rings;
 - Trash receptacles;
 - Tree Grates;
 - Tree Guards;
 - Trench Grates; and
 - Valve Boxes, Covers and Risers.
- Hydrants;
- Tanks;

- Flanges;
- Pipe clamps and restraints;
- Valves;
- Structural steel
 - rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zeos. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.
- Reinforced precast concrete; and
- Construction materials
 - those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered “structural steel”. This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts), welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

Mechanical and electrical components, equipment and systems are not considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment, compressors, meters, sensors, controls and switches, supervisory control and filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

ARTICLE 3 COMPLIANCE

- 3.01 The Contractor shall verify that products used in their projects comply with the UAIS requirement. The Contractor shall provide one of the following two certification methods for all iron and steel products used in this contract.

- i) Step Certification – Step certification is a process under which each handler (supplier, fabricator, manufacturer, etc.) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility (not company headquarters), a description of the product or item being delivered, and a signature by a manufacturer’s responsible party.

Sample Certification Letter

Company Letterhead.

Date

Company Name
Company Address
City, State Zip

Subject: Use American Iron and Steel (UAIS) Step Certification for Contract Package X - XXXXXXXXXXXXXXXXXXXX

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA’s State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxx
2. Xxx
3. Xxx

Such process took place at the following location(s):

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative
Printed Name

- ii) Final Manufacturer Certification – The final manufacturer that delivers the iron and steel products to the worksite, vendor, or contractor, provides certification that all manufacturing processes occurred in the US.

Sample Certification Letter

Company Letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: Use American Iron and Steel (UAIS) Step Certification for Contract Package X – XXXXXXXXXXXXXXXXXXXX

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location(s):

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

Printed Name

- 3.02 If the CONTRACTOR changes suppliers at any time during the construction for any iron, steel, good, or component covered by the requirement, or if any new item is added to the work, notify the RESIDENT PROJECT REPRESENTATIVE of the change, and provide to verification documentation that the new component meets the UAIS requirement.

- 3.03 The documentation letters must be submitted with the Shop Drawings provided for approval.

- a. If the letters are not available at the time of shop drawing submittal, the shop drawings must contain a statement that the materials meet the UAIS provisions, and

state that the compliance letters will be provided prior to delivery of materials to the site.

b. Materials will be rejected if required documentation is not provided.

END OF SECTION

SECTION 00 51 00

NOTICE OF AWARD

To: _____

PROJECT Description: Contract Package 5 – Return Flow Pipeline

The OWNER has considered the BID submitted by you for the above described WORK in response to its Notice to Bidders dated _____, 20__ and Instructions to Bidders.

You are hereby notified that your BID has been accepted for items in the total amount of \$_____.

You are required by the Instructions to Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within fifteen (15) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within fifteen (15) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 20__.

WAUKESHA WATER UTILITY
WAUKESHA, WISCONSIN

By _____
(Owner Name)

Title _____
(Owner Title)

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged,

By _____
(Name of Contractor)

this the _____ day of _____, 20__

By _____
(Contractor Signature)

Title _____
(Contractor Title)

END OF SECTION

SECTION 00 52 00

AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____ in the year _____ by and between Waukesha Water Utility, Waukesha, Wisconsin (hereinafter called OWNER) and _____ (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 – WORK

1.01 General:

A. The purpose of the Great Water Alliance (referred to as “Program”) is to transition the OWNER’s primary source of potable water supply from groundwater to Lake Michigan water. The Program consists of the following key components as further described in this Section:

1. New Water Supply System:

- a. A new connection to the Milwaukee Water Works Distribution System.
- b. Two, new Station Suction Pipelines.
- c. A new Oklahoma Pumping Station (also commonly referred to as the “OPS”).
- d. A new Water Supply Pipeline Sections I, II, and III (also commonly referred to as the “WSPL Sections I, II, and III”).
- e. A new Booster Pumping Station, Storage, and Chemical Facilities (also commonly referred to as the “BPS”).
- f. A new Booster Pumping Station Discharge Pipeline (also commonly referred to as the “BPS Discharge Pipeline”).
- g. A new Water Supply Control Building (also commonly referred to as the “WSCB”).

2. New Return Flow System:

- a. A new Return Flow Pumping Station (also commonly referred to as the “RFPS”).
- b. A new Return Flow Pipeline (also commonly referred to as the “RFPL”), of which this Contract is a part.
- c. A new Reaeration Structure and Outfall.

3. A new 18-Inch Gravity Sewer as part of the City of Franklin’s collection system.

1.02 The Program has been segmented into the following:

- a. Oklahoma Pumping Station
- b. Contract Package 2A – Water Supply Pipeline Sections I, II, and III, and Station Suction Pipelines
- c. Contract Package 2B – Return Flow Pipeline, BPS Discharge Pipeline, and Water Supply Pipeline Section I
- d. Contract Package 3 – Booster Pumping Station and Water Supply Control Building
- e. Return Flow Pumping Station
- f. Contract Package 5 – Return Flow Pipeline
- g. Contract Package 6 – Return Flow Pipeline, 18-Inch Sanitary Sewer, and Outfall Facilities

1.03 The Work to be done under this Contract consists of the construction of the following:

- A. Approximately 4.26 miles of new Return Flow Pipeline from the City of Waukesha's Clean Water Plant located on Sentry Drive in the City of Waukesha to a connection to Contract Package 2B located at the intersection of Les Paul Parkway and East Sunset Drive in the City of Waukesha
- B. Approximately 5.66 miles of new Return Flow Pipeline from a connection to Contract Package 2B located near the intersection of South Swartz Road and South Racine Avenue in the City of New Berlin to the connection to Contract Package 6 located west of the intersection of South Westridge Drive and West Small Road in the City of New Berlin.
- C. A segment of the Return Flow Pipeline will be provided by others under Contract Package 2B between the two Return Flow Pipeline segments noted above.
- D. Work for the above pipeline segments includes open-cut construction of pipelines comprised of 30-inch ductile iron pipe, jacking and boring of 48-inch steel casings beneath railroads and roads, including Interstate Highway 43 (IH 43), horizontal directional drilling of 36-inch high density polyethylene pipe, isolation valves, blow-off assemblies, air valves, fittings, vaults, cathodic protection, testing, traffic control, erosion and sedimentation control, connections to other Contract Packages, restoration of roadway, landscape, and other existing infrastructure, obtaining and complying with permits, startup, commissioning, training, and other appurtenant Work as shown and specified in the Contract Documents entitled Contract Package 5.

ARTICLE 2 – THE PROJECT

- 2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:
- A. Connection to Return Flow Pumping Station at the City of Waukesha's Clean Water Plant
 - B. Return Flow Pipeline and appurtenances
 - C. Connections to adjacent sections of the Return Flow Pipeline completed by others

ARTICLE 3 – ENGINEER AND RESIDENT PROJECT REPRESENTATIVE

- 3.01 The Project has been designed by Greeley and Hansen LLC who is hereinafter called ENGINEER. Black & Veatch Corporation is hereinafter called RESIDENT PROJECT REPRESENTATIVE. Greeley and Hansen LLC and Black & Veatch Corporation act as OWNER's representatives, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER and RESIDENT PROJECT REPRESENTATIVE in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

- 4.01 Time of the Essence
- A. All time limits for Substantial Completion and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.
- 4.02 Days to Achieve Substantial Completion and Final Payment
- A. The Work will be substantially completed within 630 calendar days after the date when the Contract Times commence to run as provided in paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with paragraph 15.06 of the General Conditions within 690 calendar days after the date when the Contract Times commence to run.
- 4.03 Liquidated Damages
- A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02 above plus any extensions thereof allowed in accordance with Article 11 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER the amounts listed below.

1. Three Thousand Seven Hundred dollars (\$ 3,700.00) for each calendar day that expires after the time specified in paragraph 4.02 above for Substantial Completion until the Work is substantially complete.
2. After Substantial Completion, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER Three Thousand Five Hundred dollars (\$ 3,500.00) for each calendar day that expires after the time specified in paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.
3. If CONTRACTOR shall neglect, refuse or fail to complete the remaining Work by August 31, 2023, CONTRACTOR shall pay OWNER Four Thousand dollars (\$ 4,000.00) for each calendar day that expires after August 31, 2023.
4. One Thousand dollars (\$ 1,000.00) for each calendar day that expires after the time specified in Section 01 11 00 for failing to complete work within the Sunset Bank easement until the Work is complete

ARTICLE 5 – CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to paragraphs 5.01A:

- A. In accordance with Article 5 of Section 00 41 00, for all Work, a computed price for the Contract Package 5 of :

_____ (In words)

\$ _____ (In figures)

All specific cash allowances are included in the above price and have been computed in accordance with Article 5 of Section 00 41 00;

- B. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

- A. CONTRACTOR shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 Progress Payments; Retainage

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment, on or about the first day of each month during performance of the Work as provided in paragraphs 6.02.A.1 and 6.02.A.2. below. All such payments will be measured by the schedule of values established in paragraph 2.05.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

1. Prior to Substantial Completion, OWNER will retain from progress payments, until payment is due under the terms and conditions governing final payments, amounts as follows:

Retention of 10 percent of payments authorized until the Work is 50 percent completed.

a. If the Work has been 50 percent completed as determined by RESIDENT PROJECT REPRESENTATIVE, and if the character and progress of the Work have been satisfactory to OWNER and ENGINEER, then as long as the character and progress of the Work remain satisfactory to OWNER and ENGINEER, the OWNER may suspend additional retainage withholding on the current Work, including accepted Work to date, and remaining estimates.

b. Retainage will be 10 percent of the cost of materials and equipment that are not incorporated in the Work but are delivered, suitably stored, and accompanied by documentation satisfactory to OWNER as provided in Paragraph 15.01.B.1 of the General Conditions. Stored materials and equipment retainage will be released when the materials and equipment are incorporated in the Work.

2. Upon Substantial Completion, OWNER may release a portion of the retainage to CONTRACTOR, retaining at all times an amount sufficient to cover the cost of the Work remaining to be completed.

6.03 Final Payment

A. Upon final completion and acceptance of the Work in accordance with paragraph 15.06 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 15.06.

ARTICLE 7 – CONTRACTOR'S REPRESENTATIONS

7.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

- C. CONTRACTOR is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 5.03 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in paragraph 5.06 of the General Conditions. CONTRACTOR accepts the determination set forth in paragraph SC-5.03 of the Supplementary Conditions as to the extent of the "technical data" contained in such reports and drawings upon which CONTRACTOR is entitled to rely as provided in paragraph 5.03B of the General Conditions. CONTRACTOR acknowledges that such reports and drawings are not Contract Documents and may not be complete for CONTRACTOR's purposes. CONTRACTOR acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the Site.
- E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.
- F. CONTRACTOR has considered the information known to CONTRACTOR itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) CONTRACTOR's safety precautions and programs.
- G. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies or data are necessary for the performance of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.

- H. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.
- I. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.
- J. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies that CONTRACTOR has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.
- K. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 8 – CONTRACT DOCUMENTS

8.01 Contents

- A. The Contract Documents consist of the following:
 - 1. This Agreement (Section 00 52 00)
 - 2. Notice of Award (Section 00 51 00)
 - 3. Performance Bond (Section 00 61 13)
 - 4. Payment Bond (Section 00 61 16)
 - 5. General Conditions (Section 00 72 00)
 - 6. Supplementary Conditions (Section 00 73 00)
 - 7. Disadvantaged Business Enterprises (DBE) and Local Business Participation (Waukesha Water Utility Requirements) (Section 00 73 39)
 - 8. Specifications bearing the title Contract Package 5 –Return Flow Pipeline Volume I of II and Volume II of II.
 - 9. Set of Contract Drawings bearing the title Contract Package 5 – Return Flow Pipeline.
 - 10. Addenda (numbers _____ to _____, inclusive.)
 - 11. Exhibits to this Agreement (enumerated as follows):
 - a. Notice to Proceed (Section 00 55 00)
 - b. CONTRACTOR's Bid (Section 00 41 00)
 - c. Documentation submitted by CONTRACTOR prior to Notice of Award
 - 1) Certification of Debarment (Section 00 32 00)

- 2) Certification of Non-Segregated Facilities (Section 00 82 30)
 - 3) Notice to Labor Unions or Other Organizations of Workers Nondiscrimination in Employment (Section 00 82 40)
 - 4) Disadvantaged Business Enterprise (DBE) Participation Forms (Section 00 82 50)
12. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Written Amendments
 - b. Work Change Directives
 - c. Change Order(s).
- B. The documents listed in paragraphs 8.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 8.
- D. The Contract Documents may only be amended, modified or supplemented as provided in Article 11 of the General Conditions.

ARTICLE 9 – MISCELLANEOUS

9.01 Terms

- A. Terms used in this Agreement will have the meanings indicated in the General Conditions.

9.02 Assignment of Contract

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.03 Successors and Assigns

- A. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

9.04 Severability

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to

replace such stricken provisions or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in duplicate. One counterpart each has been delivered to OWNER, and CONTRACTOR. All portions of the Contract Documents have been signed, or identified by OWNER and CONTRACTOR or on their behalf.

This Agreement will be effective on the date first above written.

CONTRACTOR:

By: _____

Title: _____

Attest: _____

Title: _____

Address for Giving Notices:

License No. _____

(Where applicable)

Designated Representative:

OWNER:

Waukesha Water Utility, Waukesha,

Wisconsin _____

By: Joseph J. Piatt

Title: Commission President

By: Joan Francoeur

Title: Commission Secretary

By: Daniel S. Duchniak, PE

Title: General Manager

To certify that Water Utility funds are available for payment of obligations that are attributable to the Water Utility's portion of the work:

By: Joseph Ciurro, CPA

Title: Administrative Services Manager

Provisions have been made to pay for the liability that will accrue under this Contract.

By: Richard Abbott

Title: City Finance Director

Date: _____

Approve as to form and execution:

By: Brian Running

Title: City Attorney

Date: _____

Attest: _____

Title: _____

Address for Giving Notices:

Designated Representative:

Name: _____

Title: _____

Address: _____

Phone: _____

Facsimile: _____

END OF SECTION

SECTION 00 55 00

NOTICE TO PROCEED

To: _____

Date: _____

Project: Contract Package 5 – Return Flow

Pipeline

You are hereby notified to commence Work in accordance with the Agreement dated _____, 20____, on or before _____, 20____, and you are to have the Work Complete per the time set forth in the Agreement and in accordance with Paragraph 15.06 of the General Conditions.

The date of completion of all Work is therefore _____, 20_____.

WAUKESHA WATER UTILITY
WAUKESHA, WISCONSIN

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED
is hereby acknowledged by _____

_____,

this the _____ day of

_____, 20____

By _____

Title _____

(NO TEXT ON THIS PAGE)

SECTION 00 61 13

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Corporation)

(Address of Corporation)

a _____ hereinafter called Principal and
(Corporation, Partnership, Firm, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto Waukesha Water Utility, its office located at 115 Delafield Street, Waukesha, Wisconsin, 53187

hereinafter called OWNER, in the penal sum of _____

_____ Dollars, \$(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____ 20__, a copy of which is hereto attached and made a part hereof for the construction of Contract Package 5.

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if they shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to Work to be performed thereunder or the Contract Documents accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the Work or to the Contract Documents.

PROVIDED, FURTHER, that no final settlement between the OWNER and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original, this the _____ day of _____ 20__.

ATTEST:

(SEAL) By: _____

ATTEST:

(SEAL)

By: _____

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

SECTION 00 61 16

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____ hereinafter called Principal and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto Waukesha Water Utility, its office located at 115 Delafield Street, Waukesha, Wisconsin 53187

hereinafter called OWNER, in the penal sum of _____

_____ Dollars, \$(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____ 20__, a copy of which is hereto attached and made a part hereof for the construction of Contract Package 5.

NOW, THEREFORE, if the Principal shall promptly make payment to all persons firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the Work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricant, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such Work, and all insurance premiums on said Work, and for all labor, performed in such Work whether by subcontractors or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to

Work to be performed thereunder the Contract Documents accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the Work or to the Contract Documents.

PROVIDED, FURTHER, that no final settlement between the OWNER and the contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original, this the _____ day of _____ 20__.

ATTEST:

(SEAL)

By: _____

ATTEST:

(SEAL)

By: _____

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

SECTION 00 72 00 STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC's Guide to the Preparation of Supplementary Conditions (EJCDC® C-800, 2013 Edition). The full EJCDC Construction series of documents is discussed in the Commentary on the 2013 EJCDC Construction Documents (EJCDC® C-001, 2013 Edition).

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	1
1.01 Defined Terms	1
1.02 Terminology	5
Article 2 – Preliminary Matters	6
2.01 Delivery of Bonds and Evidence of Insurance	6
2.02 Copies of Documents	6
2.03 Before Starting Construction	6
2.04 Preconstruction Conference; Designation of Authorized Representatives	7
2.05 Initial Acceptance of Schedules	7
2.06 Electronic Transmittals	7
Article 3 – Documents: Intent, Requirements, Reuse	8
3.01 Intent	8
3.02 Reference Standards	8
3.03 Reporting and Resolving Discrepancies	8
3.04 Requirements of the Contract Documents	9
3.05 Reuse of Documents	10
Article 4 – Commencement and Progress of the Work	10
4.01 Commencement of Contract Times; Notice to Proceed	10
4.02 Starting the Work	10
4.03 Reference Points	10
4.04 Progress Schedule	10
4.05 Delays in Contractor’s Progress	11
Article 5 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions	12
5.01 Availability of Lands	12
5.02 Use of Site and Other Areas	12
5.03 Subsurface and Physical Conditions	13
5.04 Differing Subsurface or Physical Conditions	14
5.05 Underground Facilities	15

5.06	Hazardous Environmental Conditions at Site	17
Article 6 – Bonds and Insurance		19
6.01	Performance, Payment, and Other Bonds	19
6.02	Insurance—General Provisions	19
6.03	Contractor’s Insurance	20
6.04	Owner’s Liability Insurance	23
6.05	Property Insurance	23
6.06	Waiver of Rights	25
6.07	Receipt and Application of Property Insurance Proceeds	25
Article 7 – Contractor’s Responsibilities		26
7.01	Supervision and Superintendence	26
7.02	Labor; Working Hours	26
7.03	Services, Materials, and Equipment.....	26
7.04	“Or Equals”	27
7.05	Substitutes	28
7.06	Concerning Subcontractors, Suppliers, and Others	29
7.07	Patent Fees and Royalties	31
7.08	Permits	31
7.09	Taxes	32
7.10	Laws and Regulations.....	32
7.11	Record Documents.....	32
7.12	Safety and Protection.....	32
7.13	Safety Representative	33
7.14	Hazard Communication Programs	33
7.15	Emergencies	34
7.16	Shop Drawings, Samples, and Other Submittals.....	34
7.17	Contractor’s General Warranty and Guarantee.....	36
7.18	Indemnification	37
7.19	Delegation of Professional Design Services	37
Article 8 – Other Work at the Site		38
8.01	Other Work	38
8.02	Coordination	39
8.03	Legal Relationships.....	39

Article 9 – Owner’s Responsibilities.....	40
9.01 Communications to Contractor.....	40
9.02 Replacement of Engineer	40
9.03 Furnish Data	40
9.04 Pay When Due.....	40
9.05 Lands and Easements; Reports, Tests, and Drawings	40
9.06 Insurance	40
9.07 Change Orders.....	40
9.08 Inspections, Tests, and Approvals.....	41
9.09 Limitations on Owner’s Responsibilities	41
9.10 Undisclosed Hazardous Environmental Condition.....	41
9.11 Evidence of Financial Arrangements.....	41
9.12 Safety Programs	41
Article 10 – Engineer’s Status During Construction.....	41
10.01 Owner’s Representative.....	41
10.02 Visits to Site.....	41
10.03 Project Representative.....	42
10.04 Rejecting Defective Work.....	42
10.05 Shop Drawings, Change Orders and Payments.....	42
10.06 Determinations for Unit Price Work	42
10.07 Decisions on Requirements of Contract Documents and Acceptability of Work	42
10.08 Limitations on Engineer’s Authority and Responsibilities.....	42
10.09 Compliance with Safety Program.....	43
Article 11 – Amending the Contract Documents; Changes in the Work	43
11.01 Amending and Supplementing Contract Documents	43
11.02 Owner-Authorized Changes in the Work	44
11.03 Unauthorized Changes in the Work	44
11.04 Change of Contract Price	44
11.05 Change of Contract Times	45
11.06 Change Proposals	45
11.07 Execution of Change Orders.....	46
11.08 Notification to Surety.....	47
Article 12 – Claims.....	47

12.01	Claims	47
Article 13 – Cost of the Work; Allowances; Unit Price Work.....		48
13.01	Cost of the Work	48
13.02	Allowances	50
13.03	Unit Price Work	51
Article 14 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....		52
14.01	Access to Work.....	52
14.02	Tests, Inspections, and Approvals.....	52
14.03	Defective Work.....	53
14.04	Acceptance of Defective Work.....	53
14.05	Uncovering Work	53
14.06	Owner May Stop the Work	54
14.07	Owner May Correct Defective Work.....	54
Article 15 – Payments to Contractor; Set-Offs; Completion; Correction Period		55
15.01	Progress Payments.....	55
15.02	Contractor’s Warranty of Title	58
15.03	Substantial Completion.....	58
15.04	Partial Use or Occupancy	59
15.05	Final Inspection	59
15.06	Final Payment.....	59
15.07	Waiver of Claims	61
15.08	Correction Period	61
Article 16 – Suspension of Work and Termination		62
16.01	Owner May Suspend Work	62
16.02	Owner May Terminate for Cause	62
16.03	Owner May Terminate For Convenience	63
16.04	Contractor May Stop Work or Terminate	63
Article 17 – Final Resolution of Disputes		64
17.01	Methods and Procedures.....	64
Article 18 – Miscellaneous		64
18.01	Giving Notice	64
18.02	Computation of Times.....	64
18.03	Cumulative Remedies	64

18.04	Limitation of Damages	65
18.05	No Waiver	65
18.06	Survival of Obligations	65
18.07	Controlling Law	65
18.08	Headings.....	65

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
- 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part

by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

- c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
- 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
- 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 - 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 - 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
- d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
- 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
- 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples:*

- a. Contractor shall submit the number of Samples required in the Specifications.
- b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 Cost of the Work

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 - 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 - 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
 - 1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 - 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
- 2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

- A. *Application for Payment:*
 - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (ACEC/NSPE/ASCE) Document No. C-700, 2013 edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

SC-1.01A.3 In paragraph 1.01A.3 of the General Conditions, add “and Resident Project Representative” after “Engineer”.

SC-1.01A.7 In paragraph 1.01A.7 of the General Conditions, delete "advertisement or invitation to bid" and substitute "Notice to Bidders".

SC-1.01A.9 In paragraph 1.01A.9 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

SC-1.01A.10 In the first sentence of paragraph 1.01A.10 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the sentence. Also, delete “Engineer’s” and substitute “Resident Project Representative’s” throughout the sentence.

SC-1.01A.20 Add the following to the end of paragraph 1.01A.20 of the General Conditions:

The term Program Manager has the same meaning as the term Engineer. The Engineer's Consultants are:

Ayres Associates, Inc.
CP Solutions, Inc.
GESTRA Engineering, Inc.
GRAEF-USA Inc.
Jacobs Engineering Group, Inc. (Formerly CH2M Hill Engineers, Inc.)
Kevin Richardson Consulting
Professional Services Industries, Inc.
Ramboll US Corporation (Formerly Ramboll Environ US Corporation)
TRC Environmental Corporation

SC-1.01A.21 In paragraph 1.01A.21 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

SC-1.01A.32 In paragraph 1.01A.32 of the General Conditions, delete “Engineer” and substitute “Owner” throughout the first sentence. Add the following sentence to the end of the paragraph:

The term Construction Manager has the same meaning as the term Resident Project Representative. The Resident Project Representative’s Consultant is:

R.A. Smith, Inc.

SC-1.01A.40 In paragraph 1.01A.40 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

SC-1.01A.48 In paragraph 1.01A.48 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

SC-1.01A Immediately after paragraph 1.01A.48 of the General Conditions, add the following:

49. Correction Period - The time during which the Contractor must correct defective Work or remove defective Work from the site and replace it with non-defective Work, all at no cost to the Owner, pursuant to paragraph 15.08 of the General Conditions, as supplemented.

50. Final Completion – The date upon which Contractor has, in the opinion of Resident Project Representative, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), Contractor may make application for final payment.

55. “Additional Insured”, except where otherwise expressly defined, shall mean:

Waukesha Water Utility
City of New Berlin
City of Waukesha
Town of Waukesha
Greeley and Hansen LLC
Ayres Associates, Inc.
Black & Veatch Corporation
CP Solutions, Inc.
GESTRA Engineering, Inc.
GRAEF-USA Inc.
Jacobs Engineering Group, Inc. (Formerly CH2M Hill Engineers, Inc.)
Kevin Richardson Consulting
Professional Services Industries, Inc.
R. A. Smith, Inc.
Ramboll US Corporation (Formerly Ramboll Environ US Corporation)
TRC Environmental Corporation

- SC-1.02B In the first and second sentence of paragraph 1.02B of the General Conditions, add “and Resident Project Representative” after “Engineer”.
- Delete the last sentence of paragraph 1.02B of the General Conditions.
- SC-1.02D In paragraph 1.02D.1.c of the General Conditions, delete “Engineer’s” and substitute “Resident Project Representative’s”.
- SC-2.02 Delete paragraphs 2.02A and 2.02B of the General Conditions in their entirety and substitute the following:
- A. After the Agreement has been executed, the Contractor will be furnished one complete set of printed contract documents and one copy in electronic portable document format (PDF).
 - B. Contractor shall furnish each of its Subcontractors, Suppliers, Permitting Agencies, and others such copies of the Contract Documents as may be required for their Work. All copies of the Contract Documents shall be printed from the set furnished after execution of the Agreement.
- SC-2.03A In the first sentence of paragraph 2.03A of the General Conditions, add “and Resident Project Representative” after “Engineer”.
- SC-2.04A In paragraph 2.04A of the General Conditions, add “Resident Project Representative,” after “Engineer,”
- SC-2.05 In paragraph 2.05 of the General Conditions, add “and Resident Project Representative” after “Engineer” throughout the paragraph. Also, delete paragraph 2.05A.2 of the General Conditions in its entirety and substitute the following:
- 2. Contractor's schedule of shop drawing and sample submittals will be acceptable to Engineer and Resident Project Representative only if it provides a minimum of 30 days for reviewing and processing the submittals.
- SC-2.06A In paragraph 2.06A of the General Conditions, add “Resident Project Representative,” after “Engineer,”.
- SC-2.06B In paragraph 2.06B of the General Conditions, add “Resident Project Representative,” after “Engineer,”.
- SC-3.02A Delete paragraph 3.02A.2 of the General Conditions in its entirety and replace with the following:
- 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, Engineer,

Resident Project Representative, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, Resident Project Representative, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

- SC-3.03A In paragraph 3.03A.1 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.
- In paragraph 3.03A.2 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” in the first sentence. In the second sentence, add “or Resident Project Representative” after “Engineer”.
- In paragraph 3.03A.3 of the General Conditions, delete “Owner or Engineer” and substitute “Owner, Engineer or Resident Project Representative”.
- SC-3.04A In paragraph 3.04A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.
- SC-3.04B Delete paragraph 3.04B of the General Conditions in its entirety and substitute the following:
- B. Resident Project Representative will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Resident Project Representative’s written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim. Approval from Engineer is required prior to issuing clarifications and interpretations if the clarifications could affect the design intent or the Program requirements.
- SC-3.04C In paragraph 3.04C of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.
- SC-4.01A In paragraph 4.01A of the General Conditions, delete the last sentence in its entirety and substitute the following:
- In no event will the Contract Times commence to run later than the thirtieth day after the Effective Date of the Contract.
- SC-4.03A In the third sentence of paragraph 4.03A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

- SC-4.04A In paragraph 4.04A.1 of the General Conditions, add “and Resident Project Representative” after “Engineer”.
- SC-4.05A In the first sentence of paragraph 4.05A of the General Conditions, add “Resident Project Representative,” after “Engineer,”.
- SC-4.05H Add the following immediately after paragraph 4.05G:
- H. Notwithstanding anything contained in the Contract documents to the contrary, the Contractor shall not be entitled to recover any monetary damages it might sustain as a result of any delay caused the Contractor by any act of the Owner, the Engineer, the Resident Project Representative, any separate contractor employed by Owner, or any other cause whatsoever. The Contractor further agrees that it shall make no claim for compensation for such delay and will accept in full satisfaction for such delays any extensions of time which are granted to it by the Owner.
- SC-5.02A In paragraph 5.02A.2 of the General Conditions, delete “Owner and Engineer” and substitute “Owner, Engineer, and Resident Project Representative”. Also delete “Owner, Engineer,” and substitute “Owner, Engineer, Resident Project Representative,”.
- Add the following to the end of paragraph 5.02A.2 of the General Conditions:
- If a damage is made because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, the Contractor shall submit a plan for repairing the damage to the Engineer and Resident Project Representative no later than three calendar days following the date when the damage occurred.
- SC-5.02B Add the following to the end of paragraph 5.02B of the General Conditions:
- Contractor shall remove and dispose of waste materials, rubbish, and other debris on a weekly basis or when directed by the Owner or Resident Project Representative.
- SC-5.02E Immediately after paragraph 5.02D of the General Conditions, add the following:
- E. Use of the Owner's existing washrooms, lavatories, sanitary facilities or plumbing fixtures by the Contractor or any of its employees or Subcontractors will not be permitted.
- SC-5.03B In the third sentence of paragraph 5.03B of the General Conditions, delete “Owner or Engineer,” and substitute “Owner, Engineer or Resident Project Representative,”

- SC-5.03 Immediately after paragraph 5.03B.3 of the General Conditions, add the following:
- C. The following reports prepared by the Engineer's Consultants of explorations and test of subsurface conditions at or adjacent to the site are known to Owner.
1. 4-220 D8 Geotechnical Report, Contract Package 5, Return Flow Pipeline Stations 0+00 to 1000+00
 2. 4-220 D9 Geotechnical Report, Contract Package 5, Return Flow Pipeline Stations 2000+00 to 3000+00
 3. Pothole Information
- D. The following drawings of physical conditions relating to existing surface or subsurface structures at or adjacent to the site (except Underground Facilities) are known to Owner:
1. National Avenue Bridge Information
- SC-5.04A In paragraph of 5.04A of the General Conditions, delete "promptly" and substitute "within three days". Also, delete "Engineer" and substitute "Resident Project Representative".
- SC-5.04B In paragraph 5.05B of the General Conditions, delete "promptly" and substitute "within three days". Also, delete "Engineer" and substitute "Resident Project Representative". Also, delete "Engineer's" and substitute "Resident Project Representative's".
- SC-5.04C In paragraph 5.05C of the General Conditions, delete "Engineer" and substitute "Resident Project Representative". Also, delete "Engineer's" and substitute "Resident Project Representative's" throughout the paragraphs.
- SC-5.04D In paragraph 5.05D of the General Conditions, delete "Engineer" and substitute "Resident Project Representative". Also, delete "Engineer's" and substitute "Resident Project Representative's" throughout the paragraphs.
- SC-5.06A Immediately after paragraph 5.06A.2 of the General Conditions, add the following:
3. The following reports prepared by the Engineer's Consultants of explorations and test of subsurface conditions at or adjacent to the site are known to Owner.
- a. 4-230 D2 Phase II Environmental Site Assessment Report – Site 12.17 – 2000 South West Avenue, Waukesha, Wisconsin
 - b. 4-230 D3 Phase II Environmental Site Assessment Report – Site 12.51 – 1011 Sentry Drive; Waukesha, Wisconsin

- c. 4-230 D6 Phase II Environmental Site Assessment Report – Site 12.57/12.58 – 303-309 Sentry Drive; Waukesha, Wisconsin

SC-5.06B In the third sentence of paragraph 5.06B, delete “Owner or Engineer,” and substitute “Owner, Engineer, or Resident Project Representative, and City of New Berlin (for work within the City of New Berlin),”

SC-5.06I In the first sentence of paragraph 5.06I of the General Conditions, delete “Subcontractors, and Engineer,” and substitute “Subcontractors, Engineer, and Resident Project Representative,”.

SC-5.06J In the first sentence of paragraph 5.06J of the General Conditions, delete “Owner and Engineer,” and substitute “Owner, Engineer, and Resident Project Representative,”.

SC-6.01D In paragraph 6.01D of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

SC-6.03G In the first sentence of paragraph 6.03G of the General Conditions, delete “Owner and Engineer,” and substitute “Owner, Engineer, and Resident Project Representative,”.

SC-6.03I In the second sentence of paragraph 6.03I.3 of the General Conditions, add “Resident Project Representative,” after “Engineer,” .

SC-6.03K Immediately after Paragraph 6.03J of the General Conditions, add the following:

K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers’ Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:	Statutory
Federal, if applicable (e.g., Longshoreman’s):	Statutory

Employer’s Liability:

Bodily injury, each accident	\$ 1,000,000
Bodily injury by disease, each employee	\$ 1,000,000
Bodily injury/disease aggregate	\$ 1,000,000

2. Contractor’s Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate (Except Products – Completed Operations) \$ 2,000,000

Products - Completed Operations Aggregate \$ 2,000,000

Personal and Advertising Injury (Per Person/Organization) \$ 1,000,000

Each Occurrence (Bodily Injury and Property Damage) \$ 2,000,000

Property Damage Liability insurance will provide Explosion, Collapse, and Underground coverage where applicable.

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:

Each person \$ 1,000,000

Each accident \$ 1,000,000

Property Damage:

Each accident \$ 1,000,000

[or]

Combined Single Limit (Bodily Injury and Property Damage):

Each accident \$ 1,000,000

4. Excess or Umbrella Liability:

General Aggregate \$ 10,000,000

Per Occurrence \$ 10,000,000

Maximum Self-retention Aggregate \$ 10,000,000

5. Additional Insureds: In addition to Owner and Engineer, include additional insureds as defined in Supplementary Conditions 1.01.

L. In addition, sub-contractors and any other individual working in the performance of this Contract shall be required to provide insurance coverage in the same form and amounts as the Contractor. The Contractor will be responsible for providing the sub-contractor/other individual's current Certificate of Insurance for a period of one year following the date of completion of this contract.

SC-6.04A Delete paragraphs 6.04A and 6.04B of the General Conditions in their entirety and insert the following in its place:

- A. Contractor shall purchase and maintain until the date of final acceptance, Owners and Contractor's Protective Liability Insurance to protect Owner, including its employees, officers, and agents against claims which may arise from the operations of the Contractor, or his subcontractors. The coverage shall be for not less than the following amounts or greater where required by law or regulation:

Limits per Occurrence - Bodily Injury/Property Damage	\$ 1,000,000
Limits per Person/Organization - Personal/Advertising Injury	\$ 1,000,000
Aggregate Limit per Policy Year - Products/Completed Operations	\$ 3,000,000
General Aggregate Limit per Policy Year except Products/Completed Operations	\$ 3,000,000

This insurance shall also cover the Engineer, Engineer's Consultants, Resident Project Representative, or such other engineer or engineers as may act under the Contract, against similar claims.

SC-6.05A Immediately after paragraph 6.05A.1 of the General Conditions, add the following:

- a. In addition to the Owner, Contractor, and all Subcontractors, include additional insureds as defined in Supplementary Conditions 1.01.

SC-6.06A In paragraph 6.06A of the General Conditions, add "or Resident Project Representative" after "Engineer".

SC-6.06B In paragraph 6.06B of the General Conditions, delete "and Engineer," and substitute "Engineer, and Resident Project Representative,".

SC-6.06C In paragraph 6.06C of the General Conditions, delete "Engineer," and substitute "Engineer, Resident Project Representative,".

SC-6.06D In paragraph 6.06D of the General Conditions, add "or Resident Project Representative" after "Engineer".

SC-7.01B In paragraph 7.01B of the General Conditions, delete "Engineer" and substitute "Resident Project Representative". Also, at the end of 7.01B, add "The resident superintendent shall be fluent in English."

SC-7.02B Add the following to the end of paragraph 7.02B of the General Conditions:

1. Work Hours: Perform work between 7:00 a.m. and 7:00 p.m. Mondays through Fridays only, except perform work between 7:00 a.m. and 12:00

p.m. the work day before a holiday weekend. Emergency work may be performed anytime without the Owner's written consent required in paragraph 7.02B.

2. Work After Hours: Night work may be established by Contractor as regular procedure with written consent of Owner. Such consent, however, may be revoked at any time by Owner if Contractor fails to maintain adequate equipment and supervision for proper prosecution and control of night work.
3. Engineering and Construction Observation Charges: The Contractor shall pay for additional engineering and construction observation charges required during irregular hours which may be authorized under the provisions of paragraph SC-7.02.B.2. Such additional costs shall be subsidiary obligation of the Contractor and no extra payment shall be made by the Owner on account of such Work.
3. Legal Holidays: Legal holidays observed by OWNER consist of New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day after Thanksgiving, Christmas Eve Day, Christmas Day, and New Year's Eve Day.

City of New Berlin: In addition to legal holidays, work performed in the City of New Berlin need be coordinated with special events local to the City of New Berlin, consisting of Election Day, Discover New Berlin, New Berlin Christmas, Historic and 4th of July parades, and activities hosted by Harley Davidson. The New Berlin Farmer's Market is held every Saturday morning typically from the first weekend in May through October from 8:00 AM to 12:00 PM at the New Berlin City Center located at 15055 W. National Avenue.

SC-7.06D Immediately after paragraph 7.06D of the General Conditions, add the following:

1. Within 15 days after the effective date of the Agreement, Contractor shall submit to Resident Project Representative for review a complete list in duplicate of the names of proposed manufacturers, materialmen, suppliers and subcontractors. Obtain approval of this list by Owner prior to submission of any shop drawings or product data.

SC-7.06H In paragraph 7.06H of the General Conditions, delete "Engineer" and substitute "Resident Project Representative".

SC-7.06I In paragraph 7.06I of the General Conditions, delete "Engineer" and substitute "Resident Project Representative".

SC-7.06K In paragraph 7.06K of the General Conditions, delete "Owner or Engineer" and substitute "Owner, Engineer, or Resident Project Representative".

- SC-7.06M In paragraph 7.06M of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
- SC-7.06O In paragraphs 7.06O.1 and 7.06O.2, delete “Owner or Engineer” and substitute “Owner, Engineer, or Resident Project Representative”.
- SC-7.07A In the second sentence of paragraph 7.07A of the General Conditions, delete “Owner or Engineer” and substitute “Owner, Engineer, or Resident Project Representative”.
- SC-7.07C In the first sentence of paragraph 7.07C of the General Conditions, delete “Owner and Engineer” and substitute “Owner, Engineer, and Resident Project Representative”.
- SC-7.08A In paragraph 7.08A of the General Conditions, delete the last sentence in its entirety.
- SC-7.09 Add the following language at the end of paragraph 7.09 of the General Conditions:
- Materials and equipment that are purchased for this project that will become the property of the OWNER are exempt from sales tax. OWNER will furnish the sales tax exemption number to the successful bidder at the start of work.
- SC-7.10A In the second sentence of paragraph 7.10A of the General Conditions, delete “Owner nor Engineer” and substitute “Owner, Engineer, nor Resident Project Representative”.
- SC-7.10B In the first sentence of paragraph 7.10B of the General Conditions, delete “Owner and Engineer” and substitute “Owner, Engineer, and Resident Project Representative”.
- SC-7.11A In paragraph 7.11A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.
- SC-7.12A Immediately after paragraph 7.12A.3 of the General Conditions, add the following:
4. No Duty. The duty of the Owner, Engineer, and the Resident Project Representative to observe Contractor's performance does not include any review of the adequacy of Contractor's safety measures in, on, or near the Work site or sites. Engineer or Resident Project Representative has not been retained or compensated to provide design and construction review services relating to Contractor's safety precautions required for Contractor to perform the Work.
 5. No Liability. Neither the Owner, nor any official or employee of the Owner, nor the Engineer, nor the Resident Project Representative, or any authorized assistant or agent of any of them, shall be responsible for

safety precautions and programs in connection with the Work or any liability arising therefrom.

6. Protection of Operations. The Contractor shall take all necessary precautions so as to cause no unauthorized interruption in any essential part of system operations. System operations must be maintained at the same level during construction as existed prior to construction.

Shutdowns for construction Work shall be scheduled in advance (minimum 14 days advance notice), carefully planned, and shall be carried out in close cooperation with the Owner's officials.

The Owner's officials shall retain the authority to require the cessation of construction activities and return to service of any component of the system should the need arise.

7. Special Requirements for Structural Design. All structures to be provided by the Contractor, (except those structures for which details are shown on the Drawings), that require structural design shall be designed and constructed under the observation of a structural engineer, registered in the State of Wisconsin, acting for and retained by the Contractor. Drawings for such structures shall be prepared and sealed by the structural engineer and submitted to the Resident Project Representative for record. A clear outline of the proposed construction procedure shall be shown on the drawings. A statement in writing by the structural engineer attesting that said engineer has visited the Work site or sites, that the design does satisfy the conditions as actually encountered and that the actual construction conforms to the drawings and calculations, as submitted, must be submitted to the Resident Project Representative before the Work related to such structures will be considered complete.

All temporary structures, including sheeting and bracing for excavations, that affect the safety of the public, workmen, inspectors, or Owner's or Resident Project Representative's personnel shall be regarded as structures that require structural design.

SC-7.12D In paragraph 7.12D of the General Conditions, delete "Owner and Engineer" and substitute "Owner, Engineer, and Resident Project Representative". Also, delete "Owner's and Engineer's" and substitute "Owner's, Engineer's, and Resident Project Representative's".

SC-7.12E In paragraph 7.12E of the General Conditions, delete "Owner or Engineer" and substitute "Owner, Engineer, or Resident Project Representative".

SC-7.12F In paragraph 7.12F of the General Conditions, delete "Engineer" and substitute "Resident Project Representative".

SC-7.15A In paragraph 7.15A of the General Conditions, delete "Engineer" and substitute "Resident Project Representative" throughout the paragraph.

- SC-7.16D In the first sentence of paragraph 7.16D.1 of the General Conditions, delete “acceptable to Engineer” and substitute “acceptable to Engineer and Resident Project Representative”.
- In the last sentence of paragraph 7.16D.4 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
- Add a new paragraph immediately after paragraph 7.16.D.8 of the General Conditions which is to read as follows:
9. ENGINEER, generally, will process shop drawings and return them to the CONTRACTOR in not more than 15 working days from day of receipt. If the nature of the shop drawing is such that the review cannot be completed in 15 working days, ENGINEER will advise the CONTRACTOR giving a schedule for performing the review.
- SC-7.16E In the first sentence of paragraph 7.16E.2 of the General Conditions, delete “three submittals” and substitute “two submittals”.
- In the second sentence of paragraph 7.16E.2 of the General Conditions, delete “fourth” and substitute “third”.
- SC-7.17A In the second sentence of paragraph 7.17A of the General Conditions, delete “Engineer and its” and substitute “Engineer, Resident Project Representative and their”.
- SC-7.17C In paragraph of 7.17C.1 of the General Conditions, add “or Resident Project Representative” after “Engineer”.
- In paragraph of 7.17C.2 of the General Conditions, add “or Resident Project Representative” after “Engineer”.
- In paragraph of 7.17C.6 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
- SC-7.18A In paragraph 7.18A of the General Conditions, delete “Owner and Engineer,” and substitute “Owner, Engineer, and Resident Project Representative,”.
- SC-7.18B In paragraph 7.18B of the General Conditions, delete “Owner or Engineer” and substitute “Owner, Engineer, or Resident Project Representative”.
- SC-7.18C In paragraph 7.18C of the General Conditions, delete “Engineer and Engineer’s,” and substitute “Engineer, Resident Project Representative, and Engineer’s or Resident Project Representative’s”.
- SC-8.01C In the last sentence of paragraph 8.01C of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

- SC-8.01D In the first sentence of paragraph 8.01D of the General Conditions, delete “Engineer” and substitute “Resident Project Representative.”
- SC-8.03D In paragraph 8.03D of the General Conditions, delete “Owner, or Engineer” and substitute “Owner, Engineer, or Resident Project Representative”. Also, delete “Owner and Engineer” and substitute “Owner, Engineer, and Resident Project Representative”.
- SC-9.01A In paragraph 9.01A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative.”
- SC-9.02 In paragraph 9.02 of the General Conditions, delete “Replacement of Engineer” and substitute “Replacement of Engineer and Resident Project Representative”.
- Immediately after paragraph 9.02A of the General Conditions, add the following:
- B. Owner may at its discretion appoint an onsite project representative to replace Resident Project Representative, provided Contractor makes no reasonable objection to the replacement onsite project representative. The replacement onsite project representative’s status under the Contract Documents shall be that of the former Resident Project Representative.
- SC-9.13 Immediately after paragraph 9.12B of the General Conditions, add the following:
- 9.13B. Owner will furnish a Resident Project Representative to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Resident Project Representative is not Engineer’s consultant, agent, or employee. Resident Project Representative will be Black & Veatch Corporation. The authority and responsibilities of Resident Project Representative are as follows:
1. General: Resident Project Representative's dealings in matters pertaining to the Work in general shall be with Owner, Engineer, and Contractor. Resident Project Representative's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor.
 2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor.
 3. Conferences and Meetings: Coordinate and administer progress meetings and other job conferences as required. Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes and maintain the various summaries of meeting content thereof.

4. Liaison:
 - a. Serve as Owner's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents in coordination with the Engineer.
 - b. Serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
5. Interpretation of Contract Documents: Respond to Contractor when clarifications and interpretations of the Contract Documents are needed. Obtain approval by Engineer prior to responding to any clarifications or explanations that could affect the design intent or Program requirements.
6. Shop Drawings and Samples:
 - a. Assist Engineer with obtaining a Shop Drawing submittal schedule and Shop Drawings from Contractor.
 - b. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which Resident Project Representative believes that the submittal has not been approved by Engineer.
7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications. Obtain approval by Engineer prior to accepting any modifications that could affect the design intent. The Resident Project Representative shall transmit to the Contractor the written clarification and interpretations of the drawings and specifications not affecting time and/or contract price. If required, the Engineer shall furnish within a reasonable time, and in writing, additional instructions by means of drawings or otherwise as required for the proper execution of the work.
8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-site observations of Contractor's work in progress and determine if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Owner and Contractor whenever Resident Project Representative believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of

the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer and Owner as to when, that part of work in progress that Resident Project Representative believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

9. Inspections, Tests, and System Start-ups:
 - a. Coordinate with Contractor and Engineer's testing agency for materials testing
 - b. Observe, record, and report to Owner and Engineer, appropriate details relative to the procedures and systems start-ups.
10. Records:
 - a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data logs relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, meeting summary, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
 - b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
 - c. Maintain records for use in preparing Project documentation.
11. Reports:
 - a. Furnish to Owner and Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule.
 - b. Draft and recommend to Owner proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
 - c. Immediately notify Owner and Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Owner, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
13. Certificates, Operation and Maintenance Manuals: Assist Engineer, if requested, in verifying that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are complete and applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forward to Owner prior to payment for that part of the Work.
14. Completion:
 - a. Assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
 - b. Conduct pre-final and final visit to the Site to determine completion of the Work, in the company of Owner, Engineer, and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to Owner and Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The Resident Project Representative shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including “or-equal” items).
2. Exceed limitations of Resident Project Representative’s authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor’s work.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Owner and Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

SC-Article 10	In the title of Article 10 of the General Conditions, delete “ENGINEER’S STATUS DURING CONSTRUCTION” and substitute “ENGINEER’S AND RESIDENT PROJECT REPRESENTATIVE’S STATUS DURING CONSTRUCTION”.
SC-10.01A	In paragraph 10.01A. of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.
SC-10.02A	<p>Delete paragraph 10.02A. of the General Conditions in its entirety and substitute the following:</p> <p>Engineer and Resident Project Representative will make visits to the Site at intervals appropriate to the various stages of construction as Resident Project Representative deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Resident Project Representative, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Resident Project Representative or Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Resident Project Representative’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Resident Project Representative will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.</p>
SC-10.02B	In paragraph 10.01B of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”. Also, delete “Engineer’s” and substitute “Resident Project Representative’s” throughout the paragraph.
SC-10.03	<p>Immediately after paragraph 9.02A of the General Conditions, add the following:</p> <p>B. On this project, by agreement with the Owner, Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work.</p>
SC-10.04A	In paragraph 10.04A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

- SC-10.05C In paragraph 10.05C of the General Conditions, add “and Resident Project Representative’s” after “Engineer’s”.
- SC-10.05D In paragraph 10.05D of the General Conditions, delete “Engineer’s” and substitute “Resident Project Representative’s”.
- SC-10.06A In paragraph 10.06A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
- SC-10.07A In paragraph 10.07A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.
- SC-10.08 In the title of 10.08 of the General Conditions, delete “ENGINEER’S” and substitute “ENGINEER’S AND RESIDENT PROJECT REPRESENTATIVE’S”.

Delete paragraphs 10.08A, 10.08B, 10.08C, 10.08D and 10.08E of the General Conditions in their entirety and substitute the following:

- A. Neither Engineer’s or Resident Project Representative’s authority or responsibility under this Article 10, or under any other provision of the Contract, or any decision made by Engineer or Resident Project Representative in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer or Resident Project Representative, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer or Resident Project Representative to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer and Resident Project Representative will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer and Resident Project Representative will not be responsible for Contractor’s failure to perform the Work in accordance with the Contract Documents.
- C. Engineer and Resident Project Representative will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Resident Project Representative’s review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be

delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and, in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

SC-10.09A Delete paragraph 10.09A of the General Conditions in its entirety and substitute the following:

A. While at the Site, Engineer's and Resident Project Representative's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer and Resident Project Representative have been informed.

SC-11.01A In paragraph 11.01A.1.b of the General Conditions, add "and Resident Project Representative" after "Engineer".

In the first sentence of paragraph 11.01A.3 of the General Conditions, delete "Engineer" and substitute "Resident Project Representative."

SC-11.02A In the second sentence of paragraph 11.02A of the General Conditions, add "and Resident Project Representative's" after "Engineer's".

SC-11.06A In paragraph 11.06A of the General Conditions, delete the first sentence and substitute the following:

Contractor shall submit a Change Proposal to Resident Project Representative to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer or Resident Project Representative concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract.

In the first and second sentence of paragraph 11.06A.1 of the General Conditions, delete "Engineer" and substitute "Resident Project Representative".

In the last sentence of paragraph 11.06A.1 of the General Conditions, add "or Resident Project Representative" after "Engineer".

Delete paragraph 11.06A.2 of the General Conditions in its entirety and substitute the following:

Engineer's and Resident Project Representative's Action: Engineer or Resident Project Representative will review each Change Proposal, and within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer or Resident Project Representative does not take action

on the Change Proposal within 45 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer or Resident Project Representative's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

In paragraph 11.06A.3 of the General Conditions, add "and Resident Project Representative's" after "Engineer's".

SC-11.06B In paragraph 11.06B of the General Conditions, delete "Engineer" and substitute "Resident Project Representative."

SC-12.01A In paragraph 12.01A.1 of the General Conditions, add "and Resident Project Representative's" after "Engineer's".

In paragraph 12.01A.3 of the General Conditions, add "and Resident Project Representative" after "Engineer".

SC-12.01B In the second sentence of paragraph 12.01B of the General Conditions, delete "Engineer" and substitute "Resident Project Representative."

SC-12.01C In the last sentence of paragraph 12.01C of the General Conditions, delete "Engineer" and substitute "Resident Project Representative."

SC-12.01G Immediately after paragraph 12.01G of the General Conditions, add the following:

12.02 Claims from the Public

- A. Contractor shall address any oral, verbal, or written damage claims received from residents, business owners, property owners, pedestrians, motorists, and/or any other person(s) within 2 days of first notice of the claim. CONTRACTOR shall share any claims that are received with the Resident Project Representative.
- B. Any claims received by the Owner, Engineer, and Resident Project Representative that are the responsibility of the Contractor will be shared.
- C. Contractor shall resolve any oral, verbal, or written damage claims received from residents, business owners, property owners, pedestrians, motorists, and/or any other person(s) within 45 days of first notice of the claim. The Contractor shall notify the Resident Project Representative every two weeks in writing as to the status of the resolution of the claim.
- D. Any work to be performed as a result of a claim's resolution shall be completed by the CONTRACTOR within 45 days of the claim resolution, or by the date mutually agreed to by the CONTRACTOR and

the claimant. OWNER reserves the right to withhold progress payments until claims have reached a resolution. All documentation related to the resolution of a claim is to be submitted to the RESIDENT PROJECT REPRESENTATIVE and OWNER prior to final completion of the project.

- SC-13.01B In the second sentence of paragraph 13.01B.3 and the first sentence of paragraph 13.01B.5.c of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
- SC-13.01E In paragraph 13.01E of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
- SC-13.02A In paragraph 13.01A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
- SC-13.02D In paragraph 13.01D of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
- SC-13.03D In paragraph 13.03D of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”. Also, delete “Engineer’s” and substitute “Resident Project Representative’s”.
- SC-13.03E In paragraph 13.03E of the General Conditions, delete the paragraph in its entirety and substitute the following in its place.

E. The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment under the following conditions:

1. If the total cost of a particular item of Unit Price Work amounts to 10 percent or more of the Contract Price and the variation in the quantity of that particular Contract Item or sum of sub-Contract Items of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and
2. If there is no corresponding adjustment with respect to any other item of Work; and
3. If CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof; or if OWNER believes that the quantity variation entitles OWNER to an adjustment in the unit price, either OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Paragraph 12.01B if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

SC-14.01A	In paragraph 14.01A of the General Conditions, add “Resident Project Representative,” after “Engineer,”.
SC-14.02A	In paragraph 14.02A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
SC-14.02D	In paragraph 14.02D of the General Conditions, delete “Owner’s and Engineer’s” and substitute “Owner’s, Engineer’s, and Resident Project Representative’s”. Also, delete “Owner and Engineer” and substitute “Owner, Engineer, and Resident Project Representative”.
SC-14.02E	In paragraph 14.02E of the General Conditions, add “Resident Project Representative,” after “Engineer,”.
SC-14.02F	In paragraph 14.02F of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.
SC-14.03B	In paragraph 14.03B of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
SC-14.03C	In paragraph 14.03C of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
SC-14.03D	In paragraph 14.03D of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
SC-14.05A	In paragraph 14.05A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
SC-14.05B	In paragraph 14.05B of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph. Also, delete “Engineer’s” and substitute “Resident Project Representative’s”.
SC-14.05C	In paragraph 14.05C of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph. Also, delete “Engineer’s” and substitute “Resident Project Representative’s”.
SC-14.07.A	In paragraph 14.07A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.
SC-14.07.B	In the third sentence of paragraph 14.07.B of the General Conditions, delete “and Engineer and Engineer’s consultants” and substitute “Engineer and Engineer’s consultants, and Resident Project Representative”.
SC-15.01A	In the first sentence of paragraph 15.01A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
SC-15.01B	In paragraph 15.01B.1 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

Immediately after paragraph 15.01B.3 of the General Conditions, add the following:

4. Applications for payment shall be in accordance with Section 01 29 00.

SC-15.01C In paragraphs 15.01C.1, 15.01C.2, 15.01C.3, 15.01C.4, 15.01C.5 and 15.01C.6 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraphs. Also, delete “Engineer’s” and substitute “Resident Project Representative’s” throughout the paragraphs.

SC-15.01D Delete paragraph 15.01.D of the General Conditions and substitute the following:

1. Payment will become due ninety days after presentation of the Application for Payment to Owner with Resident Project Representative's and Engineer's recommendation. The amount recommended (subject to any Owner set-offs) will become due and will be paid by Owner to Contractor.

SC-15.01E In paragraphs 15.01E.1 and 15.01E.2 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraphs.

SC-15.03A Delete paragraph 15.03A of the General Conditions and substitute the following:

When Contractor considers the entire Work ready for its intended use, Contractor shall notify Owner and Resident Project Representative in writing that the entire Work is substantially complete and request that Resident Project Representative issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Resident Project Representative an initial draft of punch list items to be completed or corrected before final payment.

SC-15.03B In paragraph 15.03B of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.

SC-15.03C In paragraph 15.03C of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph.

SC-15.04A In paragraphs 15.04A, 15.04A.1, 15.04A.2, and 15.04A.3 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraphs.

SC-15.05A In the first sentence of paragraph 15.05A of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.

- SC-15.06A In paragraph 15.06A.1 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”.
- SC-15.06B In the title of 15.06B of the General Conditions, delete “Engineer’s” and substitute “Resident Project Representative’s”.
- In paragraph 15.06B.1 of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the paragraph. Also, delete “Engineer’s” and substitute “Resident Project Representative’s” throughout the paragraph.
- SC-15.06C In paragraph 15.06C of the General Conditions, delete “Engineer’s” and substitute “Resident Project Representative’s”.
- SC-15.06D In paragraph 15.06D of the General Conditions, delete “Engineer” and substitute “Resident Project Representative”. Also, delete “Engineer’s” and substitute “Resident Project Representative’s”.
- SC-15.08A In paragraph 15.08A of the General Conditions, add “or reasonably suspected by Owner or Resident Project Representative” after “found”.
- In paragraph 15.08A.1 of the General Conditions, add “investigate and” immediately before “correct”.
- SC-16.01A In the first sentence of paragraph 16.01A of the General Conditions, delete “Contractor and Engineer” and substitute “Contractor, Engineer, and Resident Project Representative”.
- SC-16.02A In paragraph 16.02A.4 of the General Conditions, delete, “Owner or Engineer” and substitute “Owner, Engineer, or Resident Project Representative”.
- SC-16.02E In the fourth sentence of paragraph 16.02E of the General Conditions, delete “Engineer” and substitute “Resident Project Representative” throughout the sentence.
- SC-16.03 In paragraph 16.03A of the General Conditions, delete “Contractor and Engineer,” and substitute “Contractor, Engineer, and Resident Project Representation,”.
- SC-16.04A In paragraph 16.04A of the General Conditions, delete “Engineer fails” and substitute “Resident Project Representation fails”. Also, delete “Owner and Engineer” and substitute “Owner and Resident Project Representative” throughout the document.
- SC-18.09 Immediately after paragraph 18.08 of the General Conditions, add the following:
- 18.09 *Wage Rates*

- A. Wage rates for the Work shall be not less than the current prevailing wages established for the Waukesha County area, as determined by the Department of Labor of the State of Wisconsin and the U.S. Department of Labor under the Davis-Bacon and related Acts. Recent prevailing wages applicable to this project are included as Exhibit SC-A, and made a part of the Supplementary Conditions. The Contractor is advised that the prevailing wages are subject to revision on a monthly basis and that the Contractor shall comply with the then current prevailing wages.

18.10 *Contract Document Precedence*

- A. In the event of a conflict between the drawings and specifications, the specifications shall take precedence.

END OF SECTION

Exhibit SC-A

"General Decision Number: WI20200008 03/06/2020

Superseded General Decision Number: WI20190008

State: Wisconsin

Construction Types: Heavy (Sewer and Water Line and Tunnel)

Counties: Wisconsin Statewide.

TUNNEL, SEWER & WATER LINE CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020
1	01/24/2020
2	02/28/2020
3	03/06/2020

BRWI0001-002 06/03/2019

CRAWFORD, JACKSON, JUNEAU, LA CROSSE, MONROE, TREMPLEAU, AND
VERNON COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 33.80	24.28

BRWI0002-002 06/01/2019

ASHLAND, BAYFIELD, DOUGLAS, AND IRON COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 39.94	23.30

BRWI0002-005 06/01/2019

ADAMS, ASHLAND, BARRON, BROWN, BURNETT, CALUMET, CHIPPEWA,
CLARK, COLUMBIA, DODGE, DOOR, DUNN, FLORENCE, FOND DU LAC,
FOREST, GREEN LAKE, IRON, JEFFERSON, KEWAUNEE, LANGLADE,
LINCOLN, MANITOWOC, MARATHON, MARINETTE, MARQUETTE, MENOMINEE,
OCONTO, ONEIDA, OUTAGAMIE, POLK, PORTAGE, RUSK, ST CROIX, SAUK,
SHAWANO, SHEBOYGAN, TAYLOR, VILAS, WALWORTH, WAUPACA, WAUSHARA,
WINNEBAGO, AND WOOD COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 35.51	23.37

BRWI0003-002 06/03/2019

BROWN, DOOR, FLORENCE, KEWAUNEE, MARINETTE, AND OCONTO COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 34.18	23.90

BRWI0004-002 06/01/2019

KENOSHA, RACINE, AND WALWORTH COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 38.43	25.10

BRWI0006-002 06/01/2019

ADAMS, CLARK, FOREST, LANGLADE, LINCOLN, MARATHON, MENOMINEE,
ONEIDA, PORTAGE, PRICE, TAYLOR, VILAS AND WOOD COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 35.06	23.02

BRWI0007-002 06/03/2019

GREEN, LAFAYETTE, AND ROCK COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 35.57	24.22

BRWI0008-002 06/01/2019

MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 38.93	24.22

BRWI0009-001 06/03/2019

GREEN LAKE, MARQUETTE, OUTAGAMIE, SHAWANO, WAUPACA, WASHARA,
AND WINNEBAGO COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 34.18	23.90

BRWI0011-002 06/03/2019

CALUMET, FOND DU LAC, MANITOWOC, AND SHEBOYGAN COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 34.18	23.90

BRWI0013-002 06/03/2019

DANE, GRANT, IOWA, AND RICHLAND COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 35.56	24.23

BRWI0019-002 06/03/2019

BARRON, BUFFALO, BURNETT, CHIPPEWA, DUNN, EAU CLAIRE, PEPIN,
PIERCE, POLK, RUSK, ST. CROIX, SAWYER AND WASHBURN COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 33.40	24.68

BRWI0021-002 06/03/2019		

DODGE AND JEFFERSON COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 35.75	24.02

BRWI0034-002 06/03/2019		

COLUMBIA AND SAUK COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 35.56	24.23

CARP0087-001 05/01/2016		

BURNETT (W. of Hwy 48), PIERCE (W. of Hwy 29), POLK (W. of Hwys 35, 48 & 65), AND ST. CROIX (W. of Hwy 65) COUNTIES

	Rates	Fringes
Carpenter & Piledrivermen.....	\$ 36.85	18.39

CARP0252-002 06/01/2016		

ADAMS, BARRON, BAYFIELD (Eastern 2/3), BROWN, BUFFALO, BURNETT (E. of Hwy 48), CALUMET, CHIPPEWA, CLARK, COLUMBIA, CRAWFORD, DANE, DODGE, DOOR, DUNN, EAU CLAIRE, FLORENCE (except area bordering Michigan State Line), FOND DU LAC, FOREST, GRANT, GREEN, GREEN LAKE, IOWA, IRON, JACKSON, JEFFERSON, JUNEAU, KEWAUNEE, LA CROSSE, LAFAYETTE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE (except N.E. corner), MARQUETTE, MENOMINEE, MONROE, OCONTO, ONEIDA, OUTAGAMIE, PEPIN, PIERCE (E. of Hwys 29 & 65), POLK (E. of Hwys 35, 48 & 65), PORTAGE, PRICE, RICHLAND, ROCK, RUSK, SAUK, SAWYER, SHAWANO, SHEBOYGAN, ST CROIX (E. of Hwy 65), TAYLOR, TREMPLEAU, VERNON, VILAS, WALWORTH, WASHBURN, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD COUNTIES

Rates	Fringes
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CARPENTER

CARPENTER.....	\$ 33.56	18.00
MILLWRIGHT.....	\$ 35.08	18.35
PILEDRIVER.....	\$ 34.12	18.00

CARP0252-010 06/01/2016

ASHLAND COUNTY

	Rates	Fringes
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Carpenters

Carpenter.....	\$ 33.56	18.00
Millwright.....	\$ 35.08	18.35
Pile Driver.....	\$ 34.12	18.00

CARP0264-003 06/01/2016

KENOSHA, MILWAUKEE, OZAUKEE, RACINE, WAUKESHA, AND WASHINGTON COUNTIES

	Rates	Fringes
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CARPENTER.....	\$ 35.78	22.11
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CARP0361-004 05/01/2018

BAYFIELD (West of Hwy 63) AND DOUGLAS COUNTIES

	Rates	Fringes
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CARPENTER.....	\$ 36.15	20.43
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CARP2337-001 06/01/2016

ZONE A: MILWAUKEE, OZAUKEE, WAUKESHA AND WASHINGTON

ZONE B: KENOSHA & RACINE

	Rates	Fringes
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PILEDRIVERMAN

Zone A.....	\$ 31.03	22.69
Zone B.....	\$ 31.03	22.69

CARP2337-003 06/01/2019

	Rates	Fringes
MILLWRIGHT		
Zone A.....	\$ 33.58	21.53
Zone B.....	\$ 33.58	21.53

ZONE DEFINITIONS

ZONE A: MILWAUKEE, OZAUKEE, WAUKESHA AND WASHINGTON COUNTIES

ZONE B: KENOSHA & RACINE COUNTIES

ELEC0014-002 06/03/2019

ASHLAND, BARRON, BAYFIELD, BUFFALO, BURNETT, CHIPPEWA, CLARK
(except Maryville, Colby, Unity, Sherman, Fremont, Lynn &
Sherwood), CRAWFORD, DUNN, EAU CLAIRE, GRANT, IRON, JACKSON, LA
CROSSE, MONROE, PEPIN, PIERCE, POLK, PRICE, RICHLAND, RUSK, ST
CROIX, SAWYER, TAYLOR, TREMPLEAU, VERNON, AND WASHBURN
COUNTIES

	Rates	Fringes
Electricians:.....	\$ 35.59	20.87

ELEC0127-002 06/01/2019

KENOSHA COUNTY

	Rates	Fringes
Electricians:.....	\$ 40.49	30%+12.07

ELEC0158-002 06/03/2019

BROWN, DOOR, KEWAUNEE, MANITOWOC (except Schleswig),
MARINETTE(Wausaukee and area South thereof), OCONTO, MENOMINEE
(East of a line 6 miles West of the West boundary of Oconto
County), SHAWANO (Except Area North of Townships of Aniwa and
Hutchins) COUNTIES

	Rates	Fringes
Electricians:.....	\$ 33.52	29.75%+10.26

ELEC0159-003 06/01/2019

COLUMBIA, DANE, DODGE (Area West of Hwy 26, except Chester and Emmet Townships), GREEN, LAKE (except Townships of Berlin, Seneca, and St. Marie), IOWA, MARQUETTE (except Townships of Neshkoka, Crystal Lake, Newton, and Springfield), and SAUK COUNTIES

	Rates	Fringes
Electricians:.....	\$ 40.30	22.24

ELEC0219-004 06/01/2016

FLORENCE COUNTY (Townships of Aurora, Commonwealth, Fern, Florence and Homestead) AND MARINETTE COUNTY (Township of Niagara)

	Rates	Fringes
Electricians:		
Electrical contracts over \$180,000.....	\$ 32.38	18.63
Electrical contracts under \$180,000.....	\$ 30.18	18.42

ELEC0242-005 05/16/2018

DOUGLAS COUNTY

	Rates	Fringes
Electricians:.....	\$ 36.85	26.17

ELEC0388-002 06/03/2019

ADAMS, CLARK (Colby, Freemont, Lynn, Mayville, Sherman, Sherwood, Unity), FOREST, JUNEAU, LANGLADE, LINCOLN, MARATHON, MARINETTE (Beecher, Dunbar, Goodman & Pembine), MENOMINEE (Area West of a line 6 miles West of the West boundary of Oconto County), ONEIDA, PORTAGE, SHAWANO (Aniwa and Hutchins), VILAS AND WOOD COUNTIES

	Rates	Fringes
Electricians:.....	\$ 33.56	26%+11.01

ELEC0430-002 01/01/2020

RACINE COUNTY (Except Burlington Township)

	Rates	Fringes
Electricians:.....	\$ 40.30	22.19

ELEC0494-005 06/01/2019

MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
Electricians:.....	\$ 41.03	25.11

* ELEC0494-006 01/01/2020

CALUMET (Township of New Holstein), DODGE (East of Hwy 26 including Chester Township), FOND DU LAC, MANITOWOC (Schleswig), and SHEBOYGAN COUNTIES

	Rates	Fringes
Electricians:.....	\$ 34.99	22.31

ELEC0577-003 06/01/2019

CALUMET (except Township of New Holstein), GREEN LAKE (N. part including Townships of Berlin, St Marie, and Seneca), MARQUETTE (N. part including Townships of Crystal Lake, Neshkoro, Newton, and Springfield), OUTAGAMIE, WAUPACA, WAUSHARA, AND WINNEBAGO COUNTIES

	Rates	Fringes
Electricians:.....	\$ 33.15	28.50%+10.00

ELEC0890-003 06/01/2019

DODGE (Emmet Township only), GREEN, JEFFERSON, LAFAYETTE, RACINE (Burlington Township), ROCK AND WALWORTH COUNTIES

	Rates	Fringes
Electricians:.....	\$ 35.91	25.95%+10.83

ENGI0139-003 06/03/2019

REMAINING COUNTIES

	Rates	Fringes
Power Equipment Operator		
Group 1.....	\$ 41.52	22.45
Group 2.....	\$ 40.27	22.45
Group 3.....	\$ 38.97	22.45
Group 4.....	\$ 38.44	22.45
Group 5.....	\$ 36.37	22.45
Group 6.....	\$ 34.84	22.45

HAZARDOUS WASTE PREMIUMS:

EPA Level ""A"" Protection: \$3.00 per hour

EPA Level ""B"" Protection: \$2.00 per hour

EPA Level ""C"" Protection: \$1.00 per hour

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, Tower Cranes and Derricks with or without attachments with a lifting capacity of over 100 tons; Cranes, Tower Cranes, and Derricks with boom, leads and/or jib lengths 176 ft or longer.

GROUP 2: Backhoes (Excavators) weighing 130,00 lbs and over; Cranes, Tower Cranes and Derricks with or without attachments with a lifting capacity of 100 tons or less; Cranes, Tower Cranes, and Derricks with boom, leads, and/or jib lengths 175 ft or less; Caisson Rigs; Pile Driver

GROUP 3: Backhoes (Excavators) weighing under 130,000 lbs; Travelling Crane (bridge type); Milling Machine; Concrete Paver over 27 E; Concrete Spreader and Distributor; Concrete Laser Screed; Concrete Grinder and Planing Machine; Slipform Curb and Gutter Machine; Boring Machine (Directional); Dredge Operator; Skid Rigs; over 46 meter Concrete Pump.

GROUP 4: Hydraulic Backhoe (tractor or truck mounted); Hydraulic Crane, 10 tons or less; Tractor, Bulldozer, or End Loader (over 40 hp); Motor Patrol; Scraper Operator; Bituminous Plant and Paver Operator; Screed-Milling Machine; Roller over 5 tons; Concrete pumps 46 meter and under; Grout Pumps; Rotec type machine; Hydro Blaster, 10,000 psi and over; Rotary Drill Operator; Percussion Drilling Machine; Air Track Drill with or without integral hammer; Blaster; Boring Machine (vertical or horizontal); Side Boom; Trencher, wheel type or chain type having 8 inch or larger bucket; Rail Leveling Machine (Railroad); Tie Placer; Tie Extractor; Tie Tamper; Stone Leveler; Straddle

Carrier; Material Hoists; Stack Hoist; Man Hoists; Mechanic and Welder; Off Road Material Haulers.

GROUP 5: Tractor, Bulldozer, or Endloader (under 40 hp); Tampers -Compactors, riding type; Stump Chipper, large; Roller, Rubber Tire; Backfiller; Trencher, chain type (bucket under 8 inch); Concrete Auto Breaker, large; Concrete Finishing Machine (road type); Concrete Batch Hopper; Concrete Conveyor Systems; Concrete Mixers, 14S or over; Pumps, Screw Type and Gypsum); Hydrohammers, small; Brooms and Sweepers; Lift Slab Machine; Roller under 5 tons; Industrial Locomotives; Fireman (Pile Drivers and Derricks); Pumps (well points); Hoists, automatic; A-Frames and Winch Trucks; Hoists (tuggers); Boats (Tug, Safety, Work Barges and Launches); Assistant Engineer

GROUP 6: Shouldering Machine Operator; Farm or Industrial Tractor mounted equipment; Post Hole Digger; Auger (vertical and horizontal); Skid Steer Loader with or without attachments; Robotic Tool Carrier with or without attachments; Power Pack Vibratory/Ultra Sound Driver and Extractor; Fireman (Asphalt Plants); Screed Operator; Stone Crushers and Screening Plants; Air, Electric, Hydraulic Jacks (Slip Form); Prestress Machines; Air Compressor, 400 CFM or over; Refrigeration Plant/Freeze Machine; Boiler Operators (temporary heat); Forklifts; Welding Machines; Generators; Pumps over 3"; Heaters, Mechanical; Combination small equipment operator; Winches, small electric; Oiler; Greaser; Rotary Drill Tender; Conveyor; Elevator Operator

ENGI0139-007 06/03/2019

DODGE, FOND DU LAC, JEFFERSON, KENOSHA, MILWAUKEE, OZAUKEE, RACINE, SHEBOYGAN, WALWORTH, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
Power Equipment Operator		
Group 1.....	\$ 41.19	22.20
Group 2.....	\$ 40.41	22.20
Group 3.....	\$ 39.46	22.20
Group 4.....	\$ 38.41	22.20
Group 5.....	\$ 37.01	22.20

HAZARDOUS WASTE PREMIUMS:
EPA Level "A" Protection: \$3.00 per hour
EPA Level "B" Protection: \$2.00 per hour
EPA Level "C" Protection: \$1.00 per hour

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, Tower Cranes, and Derricks with or without attachments, with a lifting capacity of over 100 tons; or Cranes, Tower Cranes, and Derricks with boom, leads, and/or jib lengths measuring 176 feet or longer; Backhoes (Excavators) 130,000 lbs and over; Caisson Rigs and Pile Drivers

GROUP 2: Cranes, Tower Cranes and Derricks with or without attachments with a lifting capacity of 100 tons or under; or Cranes, Tower Cranes, and Derricks with boom, lead, and/or jib lengths measuring 175 feet or under; Backhoes (Excavators) under 130,000 lbs; Skid Rigs; Dredge Operator: Traveling Crane (Bridge type); Concrete Paver over 27 E; Concrete Spreader and Distributor; Concrete Pumps and Boring Machines (directional)

GROUP 3: Material Hoists; Stack Hoists; Tractor or Truck mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane, 5 tons or under; Manhoist; Tractor over 40 hp; Bulldozer over 40 hp; Endloader over 40 hp; Forklift, 25 ft and over; Motor Patrol; Scraper Operator; Sideboom; Straddle Carrier; Mechanic and Welder; Bituminous Plant and Paver Operator; Roller over 5 tons; Percussion Drill Operator; Rotary Drill Operator; Blaster; Air Track Drill; Trencher (wheel type or chain type having over 8 inch bucket); Elevator; Milling Machine and Boring Machine (horizontal or vertical); Backhoe Mounted Compactor

GROUP 4: Backfiller; Concrete Auto Breaker (large); Concrete Finishing Machine (road type); Roller, Rubber Tire; Concrete Batch Hopper; Concrete Conveyor System; Concrete Mixers (14S or over); Screw type Pumps and Gypsum Pumps; Grout Pumps; Tractor, Bulldozer, End Loader, under 40 hp; Pumps (well points); Trencher (chain type 8 inch or smaller bucket); Industrial Locomotives; Roller under 5 tons; Fireman (Piledrivers and Derricks); Robotic Tool Carrier with or without attachments.

GROUP 5: Hoists (Automatic); Forklift, 12 ft to 25 ft; Tamper-Compactors, riding type; A-Frame and Winch Trucks; Concrete Auto Breaker; Hydrohammer, small; Brooms and Sweepers; Hoist (Tuggers); Stump Chipper, large; Boats (Tug, Safety, Work Barges and Launch); Shouldering Machine Operator; Screed Operator; Farm or Industrial Tractor; Post Hole Digger; Stone Crushers and Screening Plants; Firemen (Asphalt Plants); Air Compressor (400 CFM or over); Augers (vertical and horizontal); Generators, 150 KW and over;

Air, Electric Hydraulic Jacks (Slipform); Prestress Machines; Skid Steer Loader with or without attachments; Boiler operators (temporary heat); Forklift, 12 ft and under; Screed Operator Milling Machine; Refrigeration Plant/Freeze Machine; Power Pack Vibratory/Ultra Sound Driver and Extractor; Generators under 150 KW; Combination small equipment operator; Compressors under 400 CFM; Welding Machines; Heaters, Mechanical; Pumps; Winches, Small Electric; Oiler and Greaser; Conveyor; High pressure utility locating machine (daylighting machine).

IRON0008-002 06/01/2019

BROWN, CALUMET, DOOR, FOND DU LAC, KEWAUNEE, MANITOWOC, MARINETTE, OCONTO, OUTAGAMI, SHAWANO, SHEBOYGAN, AND WINNEBAGO COUNTIES:

	Rates	Fringes
IRONWORKER.....	\$ 35.07	27.62

Paid Holidays: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day & Christmas Day.

IRON0008-003 06/01/2019

KENOSHA, MILWAUKEE, OZAUKEE, RACINE, WALWORTH (N.E. 2/3), WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 37.12	27.87

Paid Holidays: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day & Christmas Day.

IRON0383-001 06/01/2019

ADAMS, COLUMBIA, CRAWFORD, DANE, DODGE, FLORENCE, FOREST, GRANT, GREENE, (Excluding S.E. tip), GREEN LAKE, IOWA, JEFFERSON, JUNEAU, LA CROSSE, LAFAYETTE, LANGLADE, MARATHON, MARQUETTE, MENOMINEE, MONROE, PORTAGE, RICHLAND, ROCK (Northern area, vicinity of Edgerton and Milton), SAUK, VERNON, WAUPACA, WAUSHARA, AND WOOD COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 35.50	26.57

IRON0498-005 06/01/2019

GREEN (S.E. 1/3), ROCK (South of Edgerton and Milton), and
WALWORTH (S.W. 1/3) COUNTIES:

	Rates	Fringes
IRONWORKER.....	\$ 40.25	40.53

IRON0512-008 06/03/2019

BARRON, BUFFALO, CHIPPEWA, CLARK, DUNN, EAU CLAIRE, JACKSON,
PEPIN, PIERCE, POLK, RUSK, ST CROIX, TAYLOR, AND TREMPLEAU
COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 37.60	29.40

IRON0512-021 06/03/2019

ASHLAND, BAYFIELD, BURNETT, DOUGLAS, IRON, LINCOLN, ONEIDA,
PRICE, SAWYER, VILAS AND WASHBURN COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 33.19	29.40

LAB00113-004 06/03/2019

MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
Laborers: (Open Cut)		
Group 1.....	\$ 15.45	20.81
Group 2.....	\$ 17.72	20.81
Group 3.....	\$ 21.26	20.81
Group 4.....	\$ 30.63	20.81
Group 5.....	\$ 30.77	20.81
Group 6.....	\$ 30.83	20.81
Group 7.....	\$ 33.04	20.81

Group 8.....	\$ 35.86	20.81
Group 9.....	\$ 36.50	20.81

LABORERS CLASSIFICATIONS [OPEN CUT]

GROUP 1: Yard Laborer

GROUP 2: Landscaper

GROUP 3: Flag Person

GROUP 4: Paving Laborer

GROUP 5: General Laborer on Surface; Top Man

GROUP 6: Mud Mixer

GROUP 7: Mucker; Form Stripper; Bottom Digger and Misc;
Bottom Man and Welder on Surface

GROUP 8: Concrete Manhole Builder; Caisson Worker; Miner;
Pipe Layer; Rock Driller and Joint Man; Timber Man and
Concrete Brusher; Bracer in Trench Behind Machine & Tight
Sheeting; Concrete Formsetter and Shoveler; Jackhammer
Operator

GROUP 9: Blaster

LAB00113-005 06/03/2019

SEWER, TUNNEL & UNDERGROUND

KENOSHA AND RACINE COUNTIES

	Rates	Fringes
Laborers:		
Group 1.....	\$ 22.12	20.81
Group 2.....	\$ 28.05	20.81
Group 3.....	\$ 30.61	20.81
Group 4.....	\$ 32.38	20.81

TUNNEL WORK UNDER COMPRESSED AIR: 0-15 lbs add \$1.00, 15-30
lbs add \$2.00, over 30 lbs add \$3.00

LABORERS CLASSIFICATIONS

GROUP 1: Flagperson

GROUP 2: Top Man, General Laborer, Wellpoint Installation, Wire Mesh and Reinforcement, Concrete Worker, Form Stripper, Strike-off Work

GROUP 3: Machine and Equipment Operator, Sheeting, Form Setting, Patch Finisher, Bottom Man, Joint Sawyer, Gunnite Man, Manhole Builder, Welder-Torchman, Blaster, Caulker, Bracer, Bull Float, Conduit Worker, Mucker and Car Pusher, Raker and Luteman, Hydraulic Jacking of Shields, Shield Drivers, Mining Machine, Lock Tenders, Mucking Machine Operator, Motor Men & Gauge Tenders and operation of incidental Mechanical Equipment and all Power Driven Tools

GROUP 4: Pipelayer, Miner and Laser Operator

LAB00113-008 06/03/2019

MILWAUKEE, OZAUCREE, WASHINGTON & WAUKESHA COUNTIES

	Rates	Fringes
Laborers: (Tunnel-Free Air)		
Group 1.....	\$ 21.26	20.81
Group 2.....	\$ 30.77	20.81
Group 3.....	\$ 30.83	20.81
Group 4.....	\$ 33.04	20.81
Group 5.....	\$ 33.18	20.81
Group 6.....	\$ 35.86	20.81
Group 7.....	\$ 36.50	20.81

LABORERS CLASSIFICATIONS [TUNNEL - FREE AIR]:

GROUP 1: Flagperson

GROUP 2: General Laborer on surface; Tower Man

GROUP 3: Saw Man; Top Man

GROUP 4: Form Stripper; Car Pusher

GROUP 5: Mucker; Dinkey; Welder (rate on surface)

GROUP 6: Concrete Manhole Builder; Mucking Machine; Miner; Mining Machine; Welder; Rock Driller; Concrete Buster; Jack Hammer Operator; Caisson Worker; Pipelayer and Joint Man; Bracerman

GROUP 7: Blaster

* LAB00113-009 06/03/2019

MILWAUKEE, OZAUKEE, WASHINGTON & WAUKESHA COUNTIES

	Rates	Fringes
Laborers: (Tunnel -		
*COMPRESSED AIR 0 - 15 lbs.)		
Group 1.....	\$ 21.26	20.81
Group 2.....	\$ 30.77	20.81
Group 3.....	\$ 33.58	20.81
Group 4.....	\$ 34.38	20.81
Group 5.....	\$ 34.50	20.81
Group 6.....	\$ 37.20	20.81
Group 7.....	\$ 37.82	20.81

LABORERS CLASSIFICATIONS [TUNNEL - COMPRESSED AIR]:

- *Compressed Air 15 - 30 lbs add \$2.00 to all classifications
- *Compressed Air over 30 lbs add \$3.00 to all classifications

GROUP 1: Flagperson

GROUP 2: General Laborer on surface

GROUP 3: Lock Tender on surface

GROUP 4: Form Stripper; Car Pusher

GROUP 5: Mucker; Dinkey

GROUP 6: Mucking Machine; Miner; Mining Machine; Welder &
Rock Driller; Lock Tender in tunnel; Concrete Buster; Jack
Hammer Operator; Caisson Worker; Pielayer and Joint Man;
Bracerman; Nozzle Man on Gunite; Timber Man; Concrete
Brusher

GROUP 7: Blaster

NOTE: Hazardous & Toxic Waste Removal: add \$0.15 per hour.

LAB00140-005 06/04/2018

ADAMS, ASHLAND, BARRON, BROWN, BUFFALO, CALUMET, CHIPPEWA,
CLARK, COLUMBIA, CRAWFORD, DODGE, DOOR, DUNN, EAU CLAIRE,
FLORENCE, FOND DU LAC, FOREST, GRANT, GREEN, GREEN LAKE, IOWA,

JACKSON, JEFFERSON, JUNEAU, LACROSSE, LAFAYETTE, LANGLADE,
 LINCOLN, MANITOWOC, MARATHON, MARINETTE, MARQUETTE, MENOMINEE,
 MONROE, OCONTO, ONEIDA, OUTAGAMIE, PEPIN, PIERCE, POLK,
 PORTAGE, PRICE, RICHLAND, ROCK, RUSK, ST CROIX, SAUK, SAWYER,
 SHAWANO, SHEBOYGAN, TAYLOR, TREMPPEALEAU, VERNON, VILAS,
 WALWORTH, WASHBURN, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD
 COUNTIES

	Rates	Fringes
LABORER (SEWER & WATER)		
Group 1.....	\$ 27.41	17.20
Group 2.....	\$ 29.26	17.20
Group 3.....	\$ 29.46	17.20
Group 4.....	\$ 30.21	17.20

FOR ALL TUNNEL WORK UNDER COMPRESSED AIR: 0-15 lbs add \$1.00,
 15-30 lbs add \$2.00, over 30 lbs add \$3.00

LABORER CLASSIFICATIONS:

GROUP 1: Flagperson

GROUP 2: General Laborer, Wellpoint Installation; Form
 Stripper; Strike Off worker

GROUP 3: Sheeting Formsetting; Patch Finisher; Bottom Man;
 Joint Sawyer; Gunnite Man; Manhole Builder; Welder;
 Torchman; Blaster; Caulker Bracer; Bull Float; Mucker and
 Car Pusher; Raker and Luteman; Hydraulic jacking of
 shields, Shield Drivers; Mining Machine; Lock Tenders;
 Mucking Machine Operators; Motor Men and Gauge Tenders;
 Power Tool Operators

GROUP 4: Pipelayer, Miner, and Laser Operator

 LAB00464-002 06/04/2018

DANE AND DOUGLAS COUNTIES

	Rates	Fringes
LABORER		
Group 1.....	\$ 27.31	17.20
Group 2.....	\$ 29.51	17.20
Group 3.....	\$ 29.71	17.20
Group 4.....	\$ 30.46	17.20

FOR ALL TUNNEL WORK UNDER COMPRESSED AIR: 0 - 15 lbs add \$1.00, 15- 30 lbs add \$2.00, over 30 lbs add \$3.00

LABORERS CLASSIFICATIONS:

- GROUP 1: Flagperson
- GROUP 2: General Laborer; Wellpoint Installation; Concrete Worker; Form Stripper; Strike Off worker
- GROUP 3: Sheeting Formsetting; Patch Finisher; Bottom Man; Joint Sawyer; Gunnite Man; Manhole Builder; Welder; Torchman; Blaster; Caulker Bracer; Bull Float; Mucker and Car Pusher; Raker and Luteman; Hydraulic jacking of shields, Shield Drivers; Mining Machine; Lock Tenders; Mucking Machine Operators; Motor Men and Gauge Tenders; Power Tool Operators
- GROUP 4: Pipelayer, Miner, and Laser Operator

LAB01091-010 06/04/2018

BAYFIELD, BURNETT, IRON, SAWYER, AND WASHBURN COUNTIES

	Rates	Fringes
Laborers: (SEWER & WATER)		
Group 1.....	\$ 27.10	17.20
Group 2.....	\$ 29.16	17.20
Group 3.....	\$ 29.36	17.20
Group 4.....	\$ 30.11	17.20

FOR ALL TUNNEL WORK UNDER COMPRESSED AIR:
0 - 15 lbs add \$1.00, 15-30 lbs add \$2.00, over 30 lbs add \$3.00

LABORERS CLASSIFICATIONS:

- GROUP 1: Flagperson
- GROUP 2: Laborers, Wellpoint Installation; Form Stripper; Strike Off worker
- GROUP 3: Sheeting Formsetting; Patch Finisher; Bottom Man; Joint Sawyer; Gunnite Man; Manhole Builder; Welder; Torchman; Blaster; Caulker Bracer; Bull Float; Mucker and Car Pusher; Raker and Luteman; Hydraulic jacking of

shields, Shield Drivers; Mining Machine; Lock Tenders;
Mucking Machine Operators; Motor Men and Gauge Tenders;
Power Tool Operators

GROUP 4: Pipelayer, Miner, and Laser Operator

PLAS0599-010 06/01/2017

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER		
Area 1.....	\$ 39.46	17.17
Area 2 (BAC).....	\$ 35.07	19.75
Area 3.....	\$ 35.61	19.40
Area 4.....	\$ 34.70	20.51
Area 5.....	\$ 36.27	18.73
Area 6.....	\$ 32.02	22.99

AREA DESCRIPTIONS

AREA 1: BAYFIELD, DOUGLAS, PRICE, SAWYER, AND WASHBURN
COUNTIES

AREA 2: ADAMS, ASHLAND, BARRON, BROWN, BURNETT, CALUMET,
CHIPPEWA, CLARK, COLUMBIA, DODGE, DOOR, DUNN, FLORENCE,
FOND DU LAC, FOREST, GREEN LAKE, IRON, JEFFERSON, KEWAUNEE,
LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE,
MARQUETTE, MENOMINEE, OCONTO, ONEIDA, OUTAGAMIE, POLK,
PORTAGE, RUSK, ST CROIX, SAUK, SHAWANO, SHEBOYGAN, TAYLOR,
VILAS, WALWORTH, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD
COUNTIES

AREA 3: BUFFALO, CRAWFORD, EAU CLAIRE, JACKSON, JUNEAU, LA
CROSSE MONROE, PEPIN, PIERCE, RICHLAND, TREMPLEAU, AND
VERNON COUNTIES

AREA 4: MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

AREA 5: DANE, GRANT, GREEN, IOWA, LAFAYETTE, AND ROCK
COUNTIES

AREA 6: KENOSHA AND RACINE COUNTIES

TEAM0039-001 06/01/2019

Rates	Fringes
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TRUCK DRIVER		
1 & 2 Axles.....	\$ 29.57	22.03
3 or more Axles; Euclids Dumpton & Articulated, Truck Mechanic.....	\$ 29.72	22.03

WELL DRILLER.....	\$ 16.52	3.70

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date

for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

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SECTION 00 73 39

DISADVANTAGED BUSINESS ENTERPRISE (DBE) AND LOCAL BUSINESS PARTICIPATION

(WAUKESHA WATER UTILITY REQUIREMENTS)

ARTICLE 1 – GENERAL REQUIREMENTS

- 1.01 It is the policy of the Waukesha Water Utility (WWU) to award a share of subagreements to Disadvantaged Business Enterprises (DBE) which include but are not limited to small, minority, and women owned businesses, and Local Businesses which include businesses located within the State of Wisconsin which have the majority of their regular full-time work force located in this region. It is required that a minimum of 10% DBE and 30% Local Businesses of the total contract price are utilized.
- A. Subcontractors that meet the qualifications of both a DBE and Local Business can be utilized to meet both requirements.
- 1.02 For work to be completed in the City of Milwaukee (Section II and III of the Water Supply Pipeline), the Bidders/Offerors shall meet all requirements in accordance with Section 00 74 00.
- 1.03 This project is being partially financed by the Environmental Protection Agency (EPA) Water Infrastructure Finance and Innovation Act (WIFIA) program and the Wisconsin Department of Natural Resources (WDNR) Safe Drinking Water Loan (SDWL) program and Clean Water Fund Program (CWFP). Municipalities and their contractor(s) constructing projects designated as Federal Equivalency must comply with all applicable state and federal laws, rules and regulations in accordance with Section 00 82 50.
- 1.04 Where the OWNER believes that the CONTRACTOR and/or subcontractor has committed fraud or misrepresentation against the OWNER or has failed to comply with its contract, or provided false or fraudulent documentation, the OWNER shall notify the CONTRACTOR and/or subcontractor in writing of such determination of noncompliance and withhold up to one hundred percent (100%) of the current progress or final payment due the CONTRACTOR for up to 90 days. The amount to be withheld shall be based upon a determination of the degree which the CONTRACTOR has failed to meet its DBE or Local Business contractual commitments. The CONTRACTOR and/or subcontractor shall have the right to meet with the OWNER within 10 calendar days of receipt of the notice. After conference and conciliation, the OWNER will determine whether the CONTRACTOR and/or subcontractor is in compliance. The OWNER will refer any matters of compliance with DBE or Local Business contractual commitments to other invested parties as appropriate.
- 1.05 Forfeiting and deducting from the CONTRACTOR's progress or final payments under the contract an amount up to the dollar amount of its DBE or Local Business goal commitment that the CONTRACTOR has failed to meet. The amount to be deducted

will be based upon a determination of the extent to which the CONTRACTOR made Good Faith Efforts to achieve such commitments.

ARTICLE 2 – DBE REQUIREMENTS

- 2.01 Complete the DBE Commitment Form included in the end of this Section.
- A. Provide the names, contact information and qualifications for the prospective DBE firms that you plan to use. Delineate the various anticipated categories and/or disciplines of work/services to be provided by MBE, WBE, and SBE firms.
 - B. Summarize Bidders’/Offerors’ commitment to comply with the DBE goals for this project.
- 2.02 All DBEs must be certified by any/at least one of the following agencies:
- A. Wisconsin Department of Transportation DBE Certification
 - B. WI Dept. of Administration Supplier Diversity Programs
 - C. Milwaukee Metropolitan Sewerage District SWMBE Certification
 - D. City of Milwaukee SBE Certification

ARTICLE 3 – LOCAL BUSINESS REQUIREMENTS

- 3.01 Complete the Local Business Commitment Form included in the end of this Section.
- A. Provide the names, contact information and qualifications for the prospective Local firms that you plan to use.
 - B. Delineate the various anticipated categories and/or disciplines of work/services/material vendors to be provided Local firms.
 - C. Summarize Bidders’/Offerors’ commitment to comply with the Local Business requirements for this project.
- 3.02 A Local Business is defined as a business located within the State of Wisconsin which has the majority of its regular full-time work force located in this region.

DISADVANTAGED BUSINESS ENTERPRISE (DBE) COMMITMENT FORM

1. Name of DBE: _____

Identify DBE Statues: SBE/MBE/WBE (circle one)

Address: _____

Contact Person: _____

Contact Number: _____

Email Address: _____

Dollar Amount of Participation: \$ _____

Percent of participation _____ %

Scope of work: _____

2. Name of DBE: _____

Identify DBE Statues: SBE/MBE/WBE (circle one)

Address: _____

Contact Person: _____

Contact Number: _____

Email Address: _____

Dollar Amount of Participation: \$ _____

Percent of participation _____ %

Scope of work: _____

3. Name of DBE: _____

Identify DBE Statues: SBE/MBE/WBE (circle one)

Address: _____

Contact Person: _____

Contact Number: _____

Email Address: _____

Dollar Amount of Participation: \$ _____

Percent of participation _____ %

Scope of work: _____

4. Name of DBE: _____

Identify DBE Statues: SBE/MBE/WBE (circle one)

Address: _____

Contact Person: _____

Contact Number: _____

Email Address: _____

Dollar Amount of Participation: \$_____

Percent of participation _____%

Scope of work: _____

LOCAL BUSINESS COMMITMENT FORM

1. Name of LB: _____

Identify LB Participation: Contractor/Vendor/Other (circle one)

Address: _____

Contact Person: _____

Contact Number: _____

Email Address: _____

Dollar Amount of Participation: \$ _____

Percent of participation _____ %

Scope of work: _____

2. Name of LB: _____

Identify LB Participation: Contractor/Vendor/Other (circle one)

Address: _____

Contact Person: _____

Contact Number: _____

Email Address: _____

Dollar Amount of Participation: \$ _____

Percent of participation _____ %

Scope of work: _____

3. Name of LB: _____

Identify LB Participation: Contractor/Vendor/Other (circle one)

Address: _____

Contact Person: _____

Contact Number: _____

Email Address: _____

Dollar Amount of Participation: \$ _____

Percent of participation _____ %

Scope of work: _____

4. Name of LB: _____

Identify LB Participation: Contractor/Vendor/Other (circle one)

Address: _____

Contact Person: _____

Contact Number: _____

Email Address: _____

Dollar Amount of Participation: \$_____

Percent of participation _____%

Scope of work: _____

END OF SECTION

SECTION 00 82 30

U.S. ENVIRONMENTAL PROTECTION AGENCY

CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to federally assisted construction contracts and related subcontracts exceeding \$10,000 that are not exempt from the Equal Opportunity clause.)

The federally assisted construction contractor certifies that they do not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The federally assisted construction contractor certifies further that they will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they will not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom or otherwise. The federally assisted construction contractor agrees that (except where they have obtained identical certifications from proposed subcontractors for specific time periods) they will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that they will retain such certification in their files.

Signature

Date

Name and Title of Signer

(Please type)

Firm Name

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

(NO TEXT FOR THIS PAGE)

SECTION 00 82 40

NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS
NONDISCRIMINATION IN EMPLOYMENT

To: _____

(Name of union or organization of workers)

The undersigned currently holds contract(s) with _____

(Name of applicant)

involving funds or credit of the U.S. Government or (a) subcontract(s) with a prime contractor holding such contract(s).

The Contractor shall comply with Executive Order 11246, entitled 'Equal Employment Opportunity,' as amended by Executive Order 11375, and as supplemented in Department of Labor regulations (41 CFR Part 60).

Contractor's compliance with Executive order 11246 shall be based on implementation of the Equal Opportunity Clause, and specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4.

During the performance of this contract, the contractor agrees as follows:

- 1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
- 2) The contractor will, in all solicitations or advancements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
- 3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which

- an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.
- 4) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
 - 5) The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
 - 6) The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
 - 7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept. 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
 - 8) The contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the contractor may request the United States to enter into such litigation to protect the interests of the United States. [Sec. 202 amended by EO 11375 of Oct. 13, 1967, 32 FR 14303, 3 CFR, 1966-1970 Comp., p. 684, EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230, EO 13665 of April 8, 2014, 79 FR 20749, EO 13672 of July 21, 2014, 79 FR 42971]

Standard Federal Equal Employment Opportunity Construction Contract Specifications
(Executive Order 11246) located at 41 CFR 60-4.3:

- 1) As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. "Minority" includes:
 - i. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - ii. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - iii. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - iv. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
- 2) Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
- 3) If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it

has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

- 4) The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
- 5) Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
- 6) In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
- 7) The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

- b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
- c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
- d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
- f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
 - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
 - j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
 - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.
 - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
- 8) Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The

efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

- 9) A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
- 10) The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.
- 11) The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
- 12) The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
- 13) The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
- 14) The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to

keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

- 15) Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensuring that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. This obligation extends to all contracts containing the equal opportunity clause regardless of the amount of the contract. The term "facilities," as used in this section, means waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, wash rooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees; Provided, That separate or single-user restrooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

For bid solicitations, also include the following or equivalent information: Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246) located at 41 CFR § 60-4.2:

- 1) The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
- 2) The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Time- tables	Goals for minority participation for each trade	Goals for female participation in each trade
	8%	8%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor

performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR part 60-4. Compliance with the goals will be measured against the total work hours performed.

- 3) The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.
- 4) As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county and city, if any). This notice is furnished you pursuant to the provisions of the above contract(s) or subcontract(s) and Executive Order 11246, as amended.

Copies of this notice will be posted by the undersigned in conspicuous places available to employees or applicants for employment.

(Contractor or Subcontractor)

(Date)

SECTION 00 82 50

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION

ARTICLE 1 – GENERAL REQUIREMENTS

- 1.01 This project is being financed by the Environmental Protection Agency (EPA) Water Infrastructure Finance and Innovation Act (WIFIA) program and the Wisconsin Department of Natural Resources (WDNR) Clean Water Fund Program (CWFP). Municipalities constructing projects designated as Federal Equivalency must comply with the following federal laws and all applicable state and federal laws, rules and regulations and must ensure that their contractor(s) also comply with these laws, rules, and regulations. Contractor agrees to comply with the requirements of USEPA's Program for Utilization of Small, Minority and Women's Business Enterprises. The DBE rule can be accessed at www.epa.gov/osbp. Contractor shall comply with 40 CFR Section 33.301, and retain all records documenting compliance with the six good faith efforts. The Contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 40 CFR part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the Contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.
- A. Title VI of the Civil Rights Act of 1964 (P.L 88-352), the Rehabilitation Act of 1973 (P.L. 93-1123, 87 Stat. 355, 29 U.S.C. Sec. 794), the Older Americans Amendments of 1975 (P.L. 94-135 Sec. 303, 89 Stat. 713, 728, 42 U.S.C. Sec. 6102), and subsequent regulations, ensures access to facilities or programs regardless of race, color, national origin, sex, age or handicap.
 - B. Executive Orders 11246, as amended by Executive Orders 11375 and 12086 and subsequent regulations. Prohibits employment discrimination on the basis of race, color, religion, sex or national origin. Inclusion of the seven clauses in Section 202 of E. O. 11246 as amended by E. O. 11375 and 12086 are required in all project related contracts and subcontracts for municipalities over 3,300 population.
 - C. Executive Orders 11625, 12138 and 12432; 40 CFR part 33; Section 129 of P. L. 100-590 Small Businesses Reauthorization & Amendment Act of 1988; Public Law 102-389 (42 U.S.C. 437d); a 1993 appropriations act ("EPA's 8% statute"); Public Law 101-549, Title X of the Clean Air Acts Amendments of 1990 (42 U.S.C. 7601 note) ("EPA's 10% statute"). Encourages recipients to award construction, supply, and professional service contracts to minority and women's business enterprises (MBE/WBE) and small businesses and requires recipients to utilize affirmative steps in procurement.

- D. 40 CFR Part 33 Participation by Disadvantaged Business Enterprises in Procurement under Environmental Protection Agency (EPA) Financial Assistance Agreements.
 - E. Executive Order 12549, 3 CFR, 189; and 40 CFR Part 32, Subparts B and C. Prohibits entering into contracts or sub-contracts with individuals or businesses who are debarred or suspended. Borrowers are required to check the status of all contractors (construction and professional services) and must require contractors to check the status of subcontractors for contracts expected to be equal to or over \$25,000 via this Internet address: <http://epls.arnet.gov/>.
 - F. Executive Order 13202, as amended by Executive Order 13208, does not allow bid specifications, project agreements or other controlling agreements to require or prohibit bidders, contractors or subcontractors to enter into or to adhere to project labor agreements.
 - G. Section 513 of the Federal Water Pollution Control Act (33 USC 1372) or Section 1450(e) of the Safe Drinking Water Act (42 USC 300j-9(e)), as applicable, which requires that all laborers and mechanics employed by contractors and subcontractors on projects funded directly by or assisted in whole or in part by and through the Federal Government pursuant to this Act shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of labor in accordance with subchapter IV of chapter 31 of title 40, United States Code. With respect to the labor standards specified in this section, the Secretary of Labor has the authority and functions set forth in Reorganization Plan Numbered 14 of 1950 (64 Stat. 1267; 5 U.S.C. App.) and section 3145 of title 40, United State Code.
 - H. Please note this provision ("Davis-Bacon) applies to ALL loan recipients.
 - I. Section 13 of the Federal Water Pollution Control Act Amendments of 1972, which prohibits discrimination on the basis of sex.
 - J. 40 CFR Part 7, as it relates to the foregoing.
- 1.02 Disadvantaged Business Enterprise Policy
- A. It is the policy of the State of Wisconsin to award a fair share of sub-agreements to Disadvantaged Business Enterprises which include but are not limited to small, minority, and women's businesses.
 - B. Prime contractors and subcontractors participating in a WIFIA program or SDWL program funded project must also make good faith efforts whenever they subcontract for construction work, equipment, raw materials, or supplies. Good faith efforts include solicitation of DBEs and other steps identified in Form 8700-294, DBE Good Faith Certification Form, which the municipality must complete before receiving a loan. See the Forms section below.
 - C. These specifications define the terms, conditions, and requirements of the provisions of 40 CFR Part 35.3145(d), and the Waukesha Water Utility policy and procedures for complying with these requirements.

- D. The six affirmative steps are described in the Clean Water State Revolving Fund regulations at 40 C.F.R. '35.3145(d)(1)-(6), they represent good faith efforts to attract and utilize DBE's.
- E. As required by the award conditions of USEPA's Assistance Agreement with WDNR, the fair share percentages are 8% for MBEs and 8% for WBEs.

1.03 Good Faith Efforts

- A. Good faith efforts are activities by a recipient or its prime contractor to increase DBE awareness of procurement opportunities through race/gender neutral efforts.
- B. EPA offers the following examples to assist recipients and prime contractors in carrying out the good faith efforts.
 - 1. Ensure MBE/WBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian tribal, state and local government recipients, this will include placing MBE/WBEs on solicitation lists and soliciting them whenever they are potential sources.
 - a. Maintain and update a listing of qualified MBE/WBEs that can be solicited for construction, equipment, services and/or supplies.
 - b. Provide listings to all interested parties who request copies of the bidding or proposing documents.
 - c. Contact appropriate sources within your geographic area and state to identify qualified MBE/WBE for placement on your MBE/WBE business listings.
 - d. Utilize other MBE/WBE listings such as those of the state's minority business office, the Small Business administration, Minority Business Development Agency (MBDA) of the Department of Commerce, EPA OSDBU, and DOT.
 - e. Have state environment agency personnel review solicitation lists.
 - 2. Make information of forthcoming opportunities available to MBE/WBEs and arrange time for contracts and establish delivery schedules, where requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
 - a. Develop realistic delivery schedules which may provide for greater MBE/WBE participation.
 - b. Advertise through the minority media in order to facilitate MBE/WBE utilization. Such advertisements may include, but are not limited to, contracting and subcontracting opportunities, hiring and employment, or any other matter related to the project.

- c. Advertise in general circulation publications, trade publications, state agency publications and minority and women's business focused media concerning contracting opportunities on your projects. Maintain a list of minority and/or women's business-focused publications that may be utilized to solicit MBE/WBEs.
- 3. Consider in the contracting process whether firms competing for large contracts could subcontract with MBE/WBEs. For Indian tribal, state and local government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities in order to increase opportunities for participation by MBE/WBEs in the competitive process.
 - a. Perform an analysis to identify portions of work that can be divided and performed by qualified MBE/WBEs.
 - b. Scrutinize the elements of the total project to develop economical units of work that are within the bonding range of MBE/WBEs.
 - c. Conduct meetings, conferences, and follow-ups with MBE/WBE associations and minority media to inform these groups of opportunities to provide construction, equipment, services and supplies.
- 4. Encourage contracting with a consortium of MBE/WBEs when a contract is too large for one of these firms to handle individually.
 - a. Notify MBE/WBEs of future procurement opportunities so they may establish bidding solicitations and procurement plans.
 - b. Provide MBE/WBE trade organizations with succinct summaries of solicitations.
 - c. Provide interested MBE/WBEs with adequate information about plans, specifications, timing and other requirements of the proposed projects.
- 5. Use the services and assistance of the SBA and the MBDA.
 - a. Use the services of outreach programs sponsored by the MBDA and/or the SBA to recruit bona fide firms for placement on DBE bidders lists to assist these firms in the development of bid packaging.
 - b. Seek out Minority Business Development Centers (MBDCs) to assist recipients and prime contractors in identifying MBE/WBEs for potential work opportunities on projects
- 6. If the prime contractor awards subcontracts, require the prime contractor to take the steps in subparagraphs (1)-(5) of this section.

1.04 Pre-Contract Award Obligations

- A. Bidders/offerors are required to advertise subcontracting opportunities and to negotiate with DBE's prior to the day of the bid opening. Failure to document such affirmative efforts shall be deemed, relative to DBE compliance non-responsive.

- B. To establish a bid as responsible, the bidder/offeror will be required to document the proposed utilization of DBE's with letters of intent signed by the bidder/offeror and by the small, minority, and women's business listed in the bid. The documentation requirements are outlined in Section III.
 - C. The Waukesha Water Utility DBE policy clearly intends for bidders/offerors to contact and encourage the participation of DBE's prior to Bid opening. Affirmative efforts (the written record of conscientious and honest communications between the bidder and DBE) must be initiated and completed by the bidder prior to the day of the bid opening. All bidders must document compliance with the requirements of the DBE policy.
 - D. Contact DBEs on a Unified Certification Program (UCP) List to solicit bids from these firms (e.g., firms registered in the WisDOT UCP, <http://wisconsindot.gov/Pages/doint-bus/civil-rights/dbe/certified-firms.aspx>) . This good faith effort option is available for municipalities, prime contractors and subcontractors to comply with the DBE requirements. The individual that makes the contacts should document all the contacts, preferably using Form 8700-294a, the DBE Contacts Worksheet.
 - E. The UCP lists are the main sources of certified DBEs for the WIFIA program and the SDWL program, but there are other sources available. Any certification must meet the same requirements as those used for UCP-listed businesses. Any firm providing DBE certifications must be approved by the U.S. Environmental Protection Agency (USEPA).
 - F. Utilize DBEs registered with the UCP (e.g., WisDOT UCP, <http://wisconsindot.gov/Pages/doint-bus/civil-rights/dbe/certified-firms.aspx>) . Municipalities must require prime contractors to complete and submit with bids EPA Form 6100-4, DBE Subcontractor Utilization Form, for any DBE subcontractors they intend to use on the contract. Municipalities must then submit those forms to DNR along with other bidding documents prior to loan closing.
- 1.05 Evaluation of DBE Utilization and Good Faith Efforts
- A. As a prerequisite to demonstrate compliance with the DBE policy, ALL bidders shall provide the following with its bid:
 - 1. Completed and signed notarized certification from the bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services, in the performance of this contract if no sub-agreements will be awarded.
 - 2. "Certification of publication," or adequate evidence of proof of publication, including an actual copy of the newspaper advertisement from the newspaper utilized by the bidder. The advertisement must run one day at least fifteen (15) days prior to the day of the bid opening. A simple statement like "DBEs, including MBEs and WBEs, are encouraged to submit proposals." If just one advertisement is published for all areas of work that may be subcontracted, it should indicate those types of work that could be subcontracted. The advertisement(s) must appear in an industry

trade publication and/or the official newspaper of public record for the municipality. The bidder shall attach a copy of the advertisement to DBE Forms contained herein.

3. Names (of owners), addresses, telephone numbers of qualified DBE's that submitted proposals to the bidder.
 4. Names (of owners), addresses, telephone numbers of qualified DBE's to be utilized, AND names (of owners), addresses, telephone numbers of qualified DBE's who submitted proposals to the bidder but will not be utilized. Justification for non-utilization must be provided.
 5. Description of the work to be performed by the DBE's, including the dollar amount.
 6. Completed, signed certification from the DBE's to be utilized attesting that they are a DBE as defined by the USEPA, 40 CFR 33.005 (reference attached certification for the information necessary).
 7. Completed, signed certification from the bidder(s) utilizing small, minority, and/or women's businesses, attesting that the bidder has no controlling or dominating interest or conflict of interest with the small, minority, and/or women's business that is proposed to be utilized (reference attached certification for the information necessary).
 8. In instances where the bidder(s) does not receive any inquiries or proposals from qualified DBE's prior to bid opening, the bidder(s) must provide a written certification attesting that no responses or proposals were received (reference attached certification for information necessary).
 9. NOTE: Data Sheet #1 may be used for this purpose.
 10. Failure to submit the documentation pursuant to the requirements of A(1-8) above shall cause rejection of the bid as non-responsive.
- B. The low, responsive bidder will be deemed responsible with respect to the small, minority, and women's business requirements if:
1. The low, responsive bidder submits within ten (10) calendar days of the date on which the OWNER notifies the bidder that its bid is the apparent low responsive bid, letters of intent signed by the bidder and by the DBE listed in the bid, stating the work to be performed, and the dollar amount of the work.
 2. Failure to submit the documentation pursuant to the requirements of B(1) above may cause rejection of the bid as non-responsible.
 3. Where the bidder/offeror is considered non-responsible under this subsection, the OWNER will promptly advise the bidder/offeror, in writing, of the basis for the non-responsibility determination.

1.06 Sanctions

- A. The OWNER may reject one or all bids where the information submitted by the bidder/offeror(s) fails to objectively demonstrate compliance with the DBE

requirements (i.e., failure to place the pre-bid advertisement by the bidder(s) at least fifteen (15) days prior to the day of the bid opening shall not be considered as objectively demonstrating compliance with the DBE requirements).

- B. Upon finding that any Party has not complied with the requirements of these specifications, including misrepresenting a firm as a DBE, any one or a combination of the following actions may be taken.
 - 1. Declare the bidder/offeror, and/or subcontractor non-responsible and therefore ineligible for contract award.
 - 2. Disallow all contract costs associated with non-compliance.
 - 3. Refer any matter, which may be fraudulent to the Wisconsin Attorney General.
 - 4. Refer any matter, which may lead to criminal prosecution of a claim for funds to the Wisconsin Attorney General.

1.07 Post-Contract Award Compliance

- A. As required by the award conditions of USEPA's Assistance Agreement with WDNR, all sub-agreements of the bidder must identify that the fair share percentages are 8% for MBEs and 8% for WBEs.
- B. Within fifteen (15) days after award of the prime contract, copies of all DBE related sub-agreements between the prime contractor and first-tier subcontractors shall be submitted to the OWNER.
- C. Any and all changes in previously reported DBE utilization shall be reported to the OWNER and WDNR promptly, in writing, with appropriate documentation and reasons. If there is non-utilization or reduced utilization without good cause, the OWNER will advise the contractor, in writing, of corrective actions to be initiated. If the contractor fails to initiate such actions, the OWNER may withhold payments and/or institute other appropriate sanctions.

(NO TEXT FOR THIS PAGE)

Bidder Certification

I _____, do hereby certify that:
(Name)

1. I am _____ of the _____
(Position) (firm)
and have authority to execute this certification on behalf of the firm;
2. This firm will award no sub-agreements, including the procurement of equipment, materials, supplies, and services, in the performance of this contract.

Name of Firm _____

Signature _____

Title _____

Date _____

Corporate Seal (where appropriate)

(NO TEXT FOR THIS PAGE)

Suggested Disadvantaged Business Advertisement for
Bidders

Notice to Disadvantaged Business Enterprises:

_____, _____, _____, is
(Name of Company) (Address of Company) (Telephone)
seeking qualified Disadvantaged Business Enterprises for the _____ Project
for subcontracting opportunities in the following areas: _____,
_____, _____, _____.

All interested and qualified Disadvantaged Business Enterprises should contact, IN
WRITING, (certified letter, return receipt requested), _____, to discuss
the (Company Contact Person)
subcontracting opportunities. All negotiations must be completed prior to the bid
opening date

_____.
(Date of Bid Opening)

- * The advertisement must clearly state the method of evaluating the proposals or quotations, and the relative importance attached to each criterion. Bidders must uniformly and objectively evaluate the proposals submitted by Disadvantaged Business Enterprises in response to the advertisement based upon the evaluation criteria stated in the advertisement. The evaluation criteria must not be restrictive or exclusionary.

(NO TEXT FOR THIS PAGE)

Data Sheet #1
Disadvantaged Business Enterprises
Participation Documentation

- 1) Completed, signed certification from bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services in the performance of this contract.

OR

- 2) "Certificate of publication, or adequate evidence of proof of publication, including an actual copy of the newspaper advertisement from the "key" newspaper utilized by each bidder based upon the projects locality.

Dates of bidder advertisement: _____

Date of bid opening: _____

- 3) Names (of owners), addresses, telephone numbers of qualified Disadvantaged Business Enterprises who submitted proposals to the bidder. Specify as a small business, minority business, women's business*).

a) Name of Company:
 Name of Owners:
 Address of Company:
 Telephone Number:
 * Business Amount of subcontract:

b) Name of Company:
 Name of Owners:
 Address of Company:
 Telephone Number:
 * Business Amount of subcontract

c) Name of Company:
 Name of Owners:
 Address of Company:
 Telephone Number:
 * Business Amount of subcontract

(Furnish data for additional subcontractors on plain bond paper).

- 4) Names (of owners), addresses, telephone numbers of qualified Disadvantaged Business Enterprises to be utilized AND names (of owners), addresses, telephone numbers of Disadvantaged Business Enterprises who submitted proposals to the bidder but will not be utilized. Justification for non-utilization must be provided.

5) Description of the work to be performed by the Disadvantaged Business Enterprises, including the dollar amount.

a) Information concerning Disadvantaged Business Enterprises to be utilized:

- i) Name of Company:
Address of Company
Telephone Number:
Amount of Subcontract:
Description of work to be performed:
Will this firm be doing all (100%) of this subcontract?

Yes_____ No_____

If no, explain:

- ii) Name of Company:
Address of Company
Telephone Number:
Amount of Subcontract:
Description of work to be performed:
Will this firm be doing all (100%) of this subcontract?

Yes_____ No_____

If no, explain:

- iii) Name of Company:
Address of Company
Telephone Number:
Amount of Subcontract:
Description of work to be performed:
Will this firm be doing all (100%) of this subcontract?

Yes_____ No_____

If no, explain:

(Furnish data for additional subcontractors on plain bond paper).

b) Information concerning Disadvantaged Business Enterprises, which will not be utilized:

i) Name of Company:
Address of Company
Telephone Number:
Amount of Proposal:
Justification for rejection:

ii) Name of Company:
Address of Company
Telephone Number:
Amount of Proposal:
Justification for rejection:

iii) Name of Company:
Address of Company
Telephone Number:
Amount of Proposal:
Justification for rejection:

(Furnish data for additional subcontractors on plain bond paper).

- 6) Completed, signed certification from each Disadvantaged Business Enterprise to be utilized attesting that they are a Disadvantaged Business Enterprise as defined by the USEPA, 40 CFR 33.005.
- 7) Completed, signed certification from bidder(s) utilizing Disadvantaged Business Enterprises, attesting that the bidder has no dominating or conflict of interest with the Disadvantaged Business Enterprises to be utilized.
- 8) In instances where the bidder(s) does not receive any inquiries or proposals from Disadvantaged Business Enterprises prior to bid opening, the bidder(s) must provide a written certification attesting that no responses or proposals were received.

(Furnish data for additional subcontractors on plain bond paper.)

(NO TEXT FOR THIS PAGE)

**ATTACH CERTIFICATION OF
PUBLICATION TO THIS PAGE**

(NO TEXT FOR THIS PAGE)

Certification For
Disadvantaged Business Enterprises

I, _____, do hereby certify that:

1. I am _____ of the _____,
(Position) (Name of Firm)
and have authority to execute this certification on behalf of the firm.
2. This firm is a: (Check One Only)

_____ Small Business as defined in Section 3 of the Small Business Act
as amended (15 U.S.C. 632).

_____ Minority Business Enterprise (MBE) including ownership and
control, as defined by the USEPA, 40 CFR 33.005.

_____ Women's Business Enterprise (WBE) including ownership and
control, as defined by the USEPA, 40 CFR 33.005.
3. I will provide, upon written request, through the prime contractor or, if no prime,
directly to the Wisconsin Department of Natural Resources (WDNR) or United
States Environmental Protection Agency (USEPA), current, complete, and
accurate information regarding:
 - a) Actual work performed on any project and the payment thereof and,
 - b) Any proposed changes, in the status of the firm, which would render this
certificate inaccurate.
4. This firm will permit either the WDNR or USEPA to audit and examine its books,
records and files.

Name of Firm _____

Signature _____

Title _____

Date _____

Corporate Seal (where appropriate)

(NO TEXT FOR THIS PAGE)

Bidder Certification Regarding the Use of
Disadvantaged Business Enterprises

I, _____, do hereby certify that:

1. I am _____ of the _____
Name of Firm Position
and have authority to execute this certification on behalf of the firm;

2. This firm, its partners or directors and officers does not possess a controlling interest in ownership or conflict of interest or any other authority to control the Disadvantaged Business Enterprises to be used during the performance of the contracts.

Name of Firm _____

Signature _____

Title _____

Date _____

Corporate Seal (where appropriate)

(NO TEXT FOR THIS PAGE)

Letter of Intent Regarding the Use of
Disadvantaged Business Enterprises

The Prime Contractor, _____ will award a Contract
to _____ in the amount of \$ _____
for (Name of DBE Firm)

the _____ on the project known as the _____
_____.

This notification is pursuant to the Prime Contractor's award of the contract with the
Waukesha Water Utility.

Signed: _____ Date: _____
(Bidder/Prime Contractor)

Title: _____

Signed: _____ Date: _____
(DBE Subcontractor)

Title: _____

Corporate Seal (where appropriate)

(NO TEXT FOR THIS PAGE)

Bidder Certification for the Advertisement Regarding Subcontracting Opportunities for
Disadvantaged Business Enterprises

I _____, do hereby certify that:
(Name)

1. I am _____ of the _____
(Position) (Firm)
and have authority to execute this certification on behalf of the firm;

2. This firm did not receive any inquiries or proposals from interested
Disadvantaged Business Enterprises as a result of the required newspaper notice prior to
the bid opening date of _____.
Date of Bid Opening

Name of Firm _____

Signature _____

Title _____

Date _____

Corporate Seal (where appropriate)

END OF SECTION

(NO TEXT FOR THIS PAGE)

WAUKESHA WATER UTILITY
GREAT LAKES WATER SUPPLY PROGRAM

SIGNATURES AND SEALS

DIVISION

DESCRIPTION

DIVISION 0

PROCUREMENT AND CONTRACTING
REQUIREMENTS

DIVISION 1

GENERAL REQUIREMENTS

DIVISION 2

EXISTING CONDITIONS

DIVISION 31

EARTHWORK

DIVISION 32

SECTION 32 90 00

EXTERIOR IMPROVEMENTS, ONLY:
LANDSCAPING WORK

DIVISION 33

UTILITIES

DIVISION 40

SECTION 40 05 01

SECTION 40 05 20

PROCESS INTEGRATION, ONLY:
SUPPORTS AND ANCHORS
VALVES



SIGNATURE
PRINCIPAL ENGINEER OF CIVIL DESIGN

03.12.2020

DATE



Expiration Date: 07.31.2020

(NO TEXT FOR THIS PAGE)

WAUKESHA WATER UTILITY
GREAT LAKES WATER SUPPLY PROGRAM

SIGNATURES AND SEALS

DIVISION

DESCRIPTION

DIVISION 26

ELECTRICAL



SIGNATURE
PRINCIPAL ENGINEER ELECTRICAL DESIGN



DATE



Expiration Date: 

(NO TEXT FOR THIS PAGE)

WAUKESHA WATER UTILITY
GREAT LAKES WATER SUPPLY PROGRAM

SIGNATURES AND SEALS

DIVISION

DESCRIPTION

DIVISION 32

EXTERIOR IMPROVEMENTS, ONLY:

SECTION 32 11 23

BASE COURSES

SECTION 32 12 00

ASPHALT PAVING

SECTION 32 13 00

CONCRETE PAVING

SECTION 32 16 13

CONCRETE CURBS

SECTION 32 16 23

CONCRETE SIDEWALKS

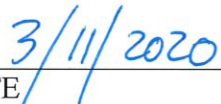
SECTION 32 17 23

PERMANENT PAVEMENT MARKINGS

SECTION 32 95 00

TRAFFIC CONTROL


SIGNATURE
PRINCIPAL ENGINEER OF PAVEMENT AND
TRAFFIC CONTROL DESIGN


DATE

SEAL:



Expiration Date: 

(NO TEXT FOR THIS PAGE)

WAUKESHA WATER UTILITY
GREAT LAKES WATER SUPPLY PROGRAM

SIGNATURES AND SEALS

DIVISION

DESCRIPTION

DIVISION 40

SECTION 40 80 50

SECTION 40 90 00

SECTION 40 90 50

SECTION 40 91 00

SECTION 40 94 13

SECTION 40 94 43

SECTION 40 95 13

SECTION 40 98 50

PROCESS INTEGRATION, ONLY:

PROCESS CONTROL SYSTEM COMMISSIONING

PROCESS CONTROL SYSTEM GENERAL
REQUIREMENTS

PROCESS CONTROL SYSTEM DESCRIPTION

PROCESS CONTROL SYSTEM INSTRUMENTS

PROCESS CONTROL SYSTEM COMPUTER AND
NETWORK HARDWARE

PROGRAMMABLE LOGIC CONTROLLER SYSTEMS

PROCESS CONTROL SYSTEM PANEL ENCLOSURES
AND EQUIPMENT

PROCESS CONTROL SYSTEM FACTORY
ACCEPTANCE TESTING

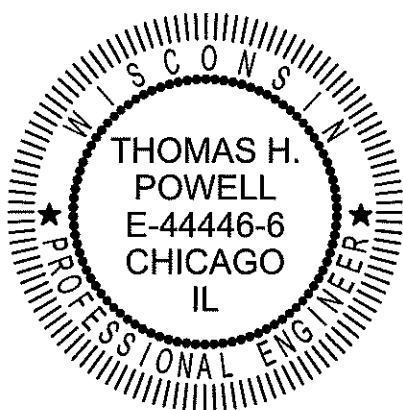
Thomas H. Powell

SIGNATURE

PRINCIPAL ENGINEER OF INSTRUMENTATION
AND CONTROL DESIGN

03-12-2020

DATE



Expiration Date: *07-31-2020*

(NO TEXT FOR THIS PAGE)

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description of Work
- B. Constraints
- C. Work By Others
- D. Storage
- E. Availability of Land
- F. CONTRACTOR's Use of Site
- G. Work Sequence
- H. Access
- I. Personnel

1.2 DESCRIPTION OF WORK

A. General:

- 1. The Program consists of the following key components:
 - a. New Water Supply System:
 - (i) A new connection to the Milwaukee Water Works Distribution System.
 - (ii) Two new Station Suction Pipelines.
 - (iii) A new Oklahoma Pumping Station (referred to as the “OPS”).
 - (iv) A new Water Supply Pipeline Sections I, II, and III (referred to as the “WSPL Sections I, II, and III”).
 - (v) A new Booster Pumping Station, Storage, and Chemical Facilities (referred to as the “BPS”).

- (vi) A new Booster Pumping Station Discharge Pipeline (referred to as the “BPS Discharge Pipeline”).
 - (vii) A new connection to the Waukesha Water Utility Distribution System.
 - b. New Return Flow System:
 - (i) A new Return Flow Pumping Station (referred to as the “RFPS”).
 - (ii) A new Return Flow Pipeline (referred to as the “RFPL”), of which this Contract is a part.
 - (iii) A new Reaeration Structure and Outfall.
 - c. A new 18-inch Sanitary Sewer as part of the City of Franklin’s collection system.
- 2. The Program has been segmented into the following :
 - a. Oklahoma Pumping Station
 - b. Contract Package 2A –WSPL Sections I, II, and III, and Station Suction Pipelines
 - c. Contract Package 2B – RFPL, BPS Discharge Pipeline, and WSPL
 - (1) A segment of the Return Flow Pipeline and the WSPL are located in the same corridor along South Racine Avenue.
 - d. Contract Package 3 – Booster Pumping Station
 - e. Return Flow Pumping Station
 - f. Contract Package 5 – Return Flow Pipeline
 - g. Contract Package 6 – Return Flow Pipeline, 18-inch Sanitary Sewer, and Outfall Facilities
- 3. The Work to be done under this Contract Package 5 consists of the construction of the following:
 - a. Approximately 4.26 miles of new Return Flow Pipeline from the City of Waukesha’s Clean Water Plant located on Sentry Drive in the City of Waukesha to a connection to Contract Package 2B located at the intersection of Les Paul Parkway and East Sunset Drive in the City of Waukesha.

- b. Approximately 5.66 miles of new Return Flow Pipeline from a connection to Contract Package 2B located near the intersection of South Swartz Road and South Racine Avenue in the City of New Berlin to the connection to Contract Package 6 located west of the intersection of South Westridge Drive and West Small Road in the City of New Berlin.
- c. Work for the above pipeline segments includes open-cut construction of pipelines comprised of 30-inch ductile iron pipe, jacking and boring of 48-inch steel casings beneath railroads and roads, including Interstate Highway 43 (IH 43), horizontal directional drilling of 36-inch high density polyethylene pipe, isolation valves, blow-off assemblies, air valves, fittings, vaults, cathodic protection, testing, traffic control, erosion and sedimentation control, restoration of roadway, landscape, and other existing infrastructure, obtaining and complying with permits, startup, commissioning, training, and other appurtenant Work as shown and specified in the Contract Documents titled Contract Package 5.

B. The Work includes:

- 1. Furnishing of labor, material, superintendence, facility, power, light, heat, fuel, water, tools, appliances, equipment, supplies, services and other means of construction necessary or proper for performing and completing the Work.
- 2. Sole responsibility for adequacy of facility and equipment.
- 3. Maintaining the Work area and site in a clean and acceptable manner.
- 4. Maintaining existing facilities in service except where otherwise specifically shown or specified.
- 5. Protection of finished and unfinished Work.
- 6. Repair and restoration of Work damaged during construction.
- 7. Remove, replace, relocate, repair, rebuild, and secure utility installations and structures damaged as a direct or indirect result of the Work.
- 8. Furnishing as necessary proper equipment and machinery, of a sufficient capacity, to facilitate the Work and to handle emergencies normally encountered in Work of this character.
- 9. Furnishing, installing, and protecting necessary guides, track rails, bearing plates, anchor and attachment bolts, and other appurtenances needed for the

installation of the devices included in the pipe, valves, and equipment specified. Make anchor bolts of appropriate size, strength and material for the purpose intended. Furnish substantial templates and shop drawings for installation.

10. All local, county, state and federal permits required to perform the work as required by the Contract Documents are the responsibility of the CONTRACTOR.

- C. Implied and Normally Required Work: It is the intent of these Specifications to provide the OWNER with complete operable systems, subsystems and other items of Work. Any part or item of Work which is reasonably implied or normally required to make each installation satisfactorily and completely operable is deemed to be included in the Work and the Contract Amount. Miscellaneous appurtenances and other items of Work incidental to meeting the intent of these Specifications are included in the Work and the Contract Amount even though these appurtenances may not be specifically called for in these Specifications.
- D. Protection and Locating Work: Protect and take responsibility for all Work, including installed pipeline, vaults, valve boxes, and other pipeline appurtenances. Prior to substantial completion, coordinate with Diggers Hotline and provide locating services for all installed pipe and pipeline appurtenances. After substantial completion, the OWNER will provide locating services.
- E. Quality of Work: Regard the apparent silence of the Contract Documents as to any detail, or the apparent omission from them of a detailed description concerning any Work to be done and materials to be furnished as meaning that only the best general practice is to prevail and that only materials and workmanship of the best quality are to be used. Interpretation of these specifications will be made upon this basis.

1.3 CONSTRAINTS

- A. The Contract Documents are intended to allow the CONTRACTOR flexibility in construction of the Work; however, the following constraints apply:
 1. Prepare and submit a comprehensive schedule of proposed sequence of construction of the various parts of the Work included under this Division for review by the RESIDENT PROJECT REPRESENTATIVE. Arrange the schedule to complete the Work in phases, meet the construction constraints, limitations, and requirements contained herein, and permit operation by the OWNER of completed phases or parts thereof.
 2. Perform the Work in the limits of construction shown.

3. Provide and make as part of the Work any temporary structures, connections, piping and other Work necessary to maintain service for existing utilities during the construction period.
4. Work on this Contract must be coordinated with OWNER and Clean Water Plant operations. Notify the RESIDENT PROJECT REPRESENTATIVE of the CONTRACTOR's planned procedures for each specific alteration of existing facilities at least 24 hours prior to the alteration during the work week (Monday through Friday). Do not begin an alteration until specific permission has been granted by the RESIDENT PROJECT REPRESENTATIVE in each case. The RESIDENT PROJECT REPRESENTATIVE will coordinate the CONTRACTOR's planned procedure with the OWNER and Clean Water Plant. The making of connections to existing facilities or other operations that interfere with the operation of the existing equipment or systems will be completed as quickly as possible and with as little delay as possible.
5. Any operational functions of the existing systems that are required to be done to facilitate the Work of the CONTRACTOR will be performed by OWNER or Clean Water Plant personnel only as identified in approved planning.
6. If it is necessary for the proper operation or maintenance of the existing systems, reschedule CONTRACTOR'S operations so that Work will not conflict with necessary operations or maintenance of the existing systems.
7. The RESIDENT PROJECT REPRESENTATIVE, OWNER, and Clean Water Plant staff will be the sole judge of when the CONTRACTOR'S operations are causing interference with existing systems. Carry out RESIDENT PROJECT REPRESENTATIVE's instructions without delay.
8. Maintain access to properties shown or specified.
9. Obtain permits required by the authorities having jurisdiction and adhere to the permit requirements. Furnish copies of approved permits to the RESIDENT PROJECT REPRESENTATIVE and ENGINEER 14 days in advance of commencing Work in each jurisdiction.
10. Obtain proper permits required by railroad authorities and adhere to the permit requirements. Furnish copies of approved permits to the RESIDENT PROJECT REPRESENTATIVE and ENGINEER 14 days in advance of commencing Work.
11. Survey and mark wetland limits clearly prior to Work in the area and maintain wetland limit markings until final acceptance of restoration. Obtain proper permits and approvals and adhere to the requirements of the regulating authority. Furnish copies of approved permits to the RESIDENT

PROJECT REPRESENTATIVE and ENGINEER 14 days in advance of commencing Work.

12. Do not complete Work in floodplains or floodways when inundated or without proper permits and approvals required by regulating authority. Furnish copies of approved permits to the RESIDENT PROJECT REPRESENTATIVE and ENGINEER 14 days in advance of commencing Work.

B. Establish a sequence of construction, including the following constraints:

1. Through a coordinated effort, construct Work in stages to accommodate the public's use of right-of-way and the OWNER's and the Clean Water Plant's use of premises as applicable during construction period and in accordance with the sequence of construction constraints specified. Coordinate construction schedules and operations with the RESIDENT PROJECT REPRESENTATIVE.
2. Construction Schedule Constraints:
 - a. Sunset Bank Easement
 - (1) Complete pipe installation within the Sunset Bank Easement, pressure and leakage test as specified in Section 01 45 50, pave, and restore the disturbed area and demobilize in a maximum of 35 consecutive days after work commences.
 - (2) Phase the work within the Sunset Bank Easement to allow a minimum of ten parking spaces, including two handicap spaces, along the north side of the building to remain open at all times. CONTRACTOR to maintain a minimum of two handicap spaces along the north side of the building throughout the duration of construction.
 - b. Sequencing of Work with other Contract Packages:
 - (i) Commence pipe installation at Station 0+00 and provide restrained ductile iron cap as shown no later than 100 days after Notice to Proceed. Complete pipe laying, pressure and leakage test as specified in Section 01 45 50, and restore the disturbed area between Station 0+00 and a point 1,400 linear feet downstation within the right-of-way along Sentry Drive no later than 150 days after Notice to Proceed. Do not provide pipeline closure with the Return Flow Pumping Station, which will be provided by others.

- (ii) Commence pipe installation at the Contract Interface with Contract Package 2B and provide restrained ductile iron cap as shown. Complete pipe laying, pressure and leakage test as specified in Section 01 45 50, and restore the disturbed area between the Contract Interface and at least 1,000 linear feet upstation within the right-of-way along Les Paul Parkway no later than 210 days after Notice to Proceed. Do not provide pipeline closure with Contract Package 2B, which will be provided by others.
 - (iii) Commence pipe installation at Station 2000+00 and provide restrained ductile iron cap as shown. Complete pipe laying, pressure and leakage test as specified in Section 01 45 50, and restore the disturbed area between Station 2000+00 and a point 1,000 linear feet downstation within the right-of-way along Racine Avenue no later than 210 days after Notice to Proceed. Do not provide pipeline closure with Contract Package 2B, which will be provided by others.
 - (iv) Commence pipe installation at the Contract Interface with Contract Package 6 and provide restrained ductile iron cap as shown no later than 150 days after Notice to Proceed. Complete pipe laying, pressure and leakage test as specified in Section 01 45 50, and restore the disturbed area at least 1,000 linear feet upstation from the Contract Interface within the right-of-way along West Small Road no later than 210 days after Notice to Proceed. Do not provide pipeline closure with Contract Package 6, which will be provided by others.
3. Provide traffic control, install pipeline, and permanently restore pavement for Racine Avenue pipeline crossings to a minimum of 5 feet beyond the edge of pavement on both sides of each crossing. Coordinate construction to occur concurrently to pipeline crossings of Racine Avenue by others under Contract Package 2B such that the total duration of Racine Avenue road closure does not exceed 5 consecutive days.

1.4 WORK BY OTHERS

- A. Work on other projects, which may take place concurrently with this Contract and which is excluded from this Contract, is as follows:
 - 1. Oklahoma Pumping Station:
 - a. A new Oklahoma Pumping Station on the southeast quadrant of West Oklahoma Avenue and South 76th Street in the City of Milwaukee

that will be part of the OWNER's new water supply system and will be installed adjacent to this Work.

2. Contract Package 2A – Water Supply Pipeline Sections I, II, and III, and Station Suction Pipelines:
 - a. A new Water Supply Pipeline from near the intersection of South Swartz Road and West Coffee Road in the City of New Berlin to near the intersection of South 76th Street and West Oklahoma Avenue in the City of Milwaukee that will be part of the OWNER's new water supply system.
 - b. A new Oklahoma Pumping Station Suction Pipeline from near the intersection of South 76th Street and West Oklahoma Avenue in the City of Milwaukee to near the intersection of South 74th Street and West Oklahoma Avenue in the City of Milwaukee that will be part of the OWNER's new water supply system.
3. Contract Package 2B: Return Flow Pipeline, BPS Discharge Pipeline, and Water Supply Pipeline.
 - a. A new Water Supply Pipeline from near the intersection of South Swartz Road and West Coffee Road in the City of New Berlin to the Booster Pumping Station Site in the City of Waukesha that will be part of the OWNER's new water supply system and will be installed adjacent to this Work.
 - b. A new BPS Discharge Pipeline from the Booster Pumping Station in the City of Waukesha to connection to the existing OWNER's distribution system in the City of Waukesha that will be part of the OWNER's new water supply system.
 - c. A new Return Flow Pipeline from the intersection of Les Paul Parkway and East Sunset Drive in the City of Waukesha to near the intersection of South Swartz Road and South Racine Avenue in the City of New Berlin that will be part of the OWNER's new return flow system and will be installed adjacent to this Work.
 - (1) Coordinate with construction of the new Return Flow Pipeline provided as part of Contract Package 2B, which will interconnect with this Contract at the intersection of Les Paul Parkway and East Sunset Drive in the City of Waukesha and near the intersection of South Swartz Road and South Racine Avenue in the City of New Berlin.
4. Contract Package 3 – Booster Pumping Station:

- a. A new Booster Pumping Station, Storage, and Chemical Facilities in the City of Waukesha that will be part of the OWNER's new water supply system.
- 5. Return Flow Pumping Station:
 - a. A new Return Flow Pumping Station located at the City of Waukesha's Clean Water Plant on Sentry Drive in the City of Waukesha that will be part of the OWNER's new return flow system and will be installed adjacent to this Work.
 - (1) Coordinate construction with construction of the new Return Flow Pumping Station, which will interconnect with this Contract at the City of Waukesha's Clean Water Plant on Sentry Drive in the City of Waukesha.
- 6. Contract Package 6 – Return Flow Pipeline, 18-Inch Sanitary Sewer, and Outfall Facilities:
 - a. A new Return Flow Pipeline from near the intersection of South Westridge Drive and West Small Road in the City of New Berlin to near the intersection of South 60th Street and West Oakwood Road in the City of Franklin and be installed adjacent to this Work.
 - (1) Coordinate with construction of the new Return Flow Pipeline provided as part of Contract Package 6, which will interconnect with this Contract near the intersection of South Westridge Drive and West Small Road in the City of New Berlin.
 - b. A new 18-inch Sanitary Sewer from the connection to the Ryan Creek Interceptor located just south of West Ryan Road on South 60th Street in the City of Franklin to the connection to the existing sewer collection system approximately 4,000 feet south of Ryan Road on 60th Street near the 60th Street Industrial Park Lift Station in the City of Franklin that will be part of the City of Franklin's collection system.
 - c. A new reaeration structure and outfall located on the southeast quadrant of South 60th Street and West Oakwood Road in the City of Franklin that will be part of the OWNER's new return flow system.
- B. See Specification 32 95 00 for additional projects to be coordinated with during construction.

1.5 STORAGE

- A. Provide storage conditions subject to approval by the RESIDENT PROJECT REPRESENTATIVE for materials and equipment.
- B. Provide adequate and satisfactory security. Provide protection as recommended by respective manufacturers and suppliers of equipment and materials.

1.6 AVAILABILITY OF LAND

- A. The site available for CONTRACTOR's use during the performance of the Work is limited to the area defined and shown.
- B. Employ an area within the defined limits for staging, pipe stringing and truck turnaround areas subject to approval by the RESIDENT PROJECT REPRESENTATIVE.
- C. Restore sites used for an office to original or better condition upon completion of the Work.
- D. The OWNER has acquired permanent easements from several property owners as shown. The recorded easements are included as an appendix. Conform operations to constraints described in the agreements. Field stake the limits of the easements prior to commencing construction.
 - 1. The easements for Parcel NBC 1285994 (16310 W Small Road) and NBC 1286999002 have not been recorded. It is anticipated to be recorded no later than July 2020. No work within these parcels can occur until the recorded easements are provided.
- E. The CONTRACTOR may independently elect to acquire additional area off-site to support construction activities at no additional cost to the OWNER and as follows:
 - 1. Additional off-site area cannot result in additional temporary or permanent wetland impacts.
 - 2. Obtain and adhere to additional permit requirements in accordance with the Federal, State, or local authorities having jurisdiction and furnish copies of approved permits to the RESIDENT PROJECT REPRESENTATIVE and ENGINEER 14 days in advance of commencing Work.

1.7 CONTRACTOR'S USE OF SITE

- A. In addition to the requirements of Division 0, limit use of site for Work and storage to allow for the following:

1. Coordination of the Work under this Contract with the work of the other contractors where Work under this Contract encroaches on the work of other contractors.
2. OWNER occupancy and access to operate existing facilities.
3. Coordination of site use with OWNER, RESIDENT PROJECT REPRESENTATIVE, ENGINEER, and authority having jurisdiction.
4. Responsibility for protection and safekeeping of products under this Contract.
5. Maintain access for properties with one access entrance with limited closures during construction activity with no overnight closures.
6. Conduct construction operations so that inconvenience to the public is minimized.

1.8 WORK SEQUENCE

- A. Construct Work in stages to accommodate the OWNER's, Clean Water Plant's, property owners', and the public's use as applicable during the construction period and in accordance with the limitations on the sequence of construction. Coordinate construction schedules and operations with RESIDENT PROJECT REPRESENTATIVE.
- B. Coordinate Work of subcontractors.

1.9 ACCESS

- A. OWNER or RESIDENT PROJECT REPRESENTATIVE will access site during entire period of construction. Coordinate with OWNER and RESIDENT PROJECT REPRESENTATIVE in construction operations.
- B. The following listed authorities having jurisdiction may access premises during the period of construction. Cooperate with representatives of OWNER, agencies, and municipalities in construction operations.
 1. Canadian National Railway Company
 2. City of New Berlin
 3. City of Waukesha
 4. Potawatomi Tribe
 5. Public Service Commission

6. Town of Waukesha
7. United States Army Corps of Civil Engineers
8. United States Fish and Wildlife Service
9. Waukesha County
10. Wisconsin and Southern Railroad
11. Wisconsin Department of Agriculture, Trade and Consumer Protection
12. Wisconsin Department of Transportation
13. Wisconsin Department of Natural Resources
14. Wisconsin Historical Society
15. United States Environmental Protection Agency
16. United States Department of Transportation

- C. Representatives of the WDNR and any other state, county, or local agencies shall have access to the work whenever it is in preparation or progress and provide proper facilities for such access and inspection. WDNR or its authorized representative shall have access to any books, documents, papers, and records of the CONTRACTOR or subcontractor which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcriptions thereof.

1.10 PERSONNEL

- A. Make available for inspection a copy of State Photo Identification Card or Driver's License, upon request by OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE, for employees of Contractor or Subcontractor performing Work.
- B. The City of Waukesha reserves the right to request identification and deny access to the City of Waukesha's Clean Water Plant facilities to any person, including employees of any Contractor or Subcontractor, who in the City of Waukesha's opinion has not provided proper identification or documentation of the same. Facility access denial, due to lack of proper identification, will not entitle the CONTRACTOR to claims.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

- A. Starting Work: Start Work within 10 days following the date stated in the Notice to Proceed, unless otherwise stated in the Notice to Proceed, and execute with such progress as may be required to prevent delay to other contractors or to the general completion of the project. Execute Work at such items and in or on such parts of the project, and with such forces, material and equipment, as to complete the Work in the time established by the Contract. Schedule and direct the Work so that it provides an orderly progression to completion within the specified time for completion.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 26 00

CHANGE ORDER, WORK CHANGE DIRECTIVE AND FIELD ORDER PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Definitions
- B. Change Orders
- C. Work Change Directives
- D. Field Orders

1.2 DEFINITIONS

- A. Change Order: Refer to the Change Order definition in Article 1 of the General Conditions.
- B. Work Change Directive: Refer to the Work Change Directive definition in Article 1 of the General Conditions.
- C. Overhead: Overhead is defined as the cost of administration, field office and home office costs, general superintendence, office engineering and estimating costs, other required insurance, materials used in temporary structures (not including form work), additional premiums on the performance bond of the CONTRACTOR, the use of small tools, scheduling costs, and all other costs incidental to the performance of the change or the cost of doing business.
- D. Field Order: Refer to the Field Order definition in Article 1 of the General Conditions.

1.3 CHANGE ORDERS

- A. Initiation of Proposals:
 - 1. From time to time, the OWNER or the RESIDENT PROJECT REPRESENTATIVE may issue a request for a Change Order Proposal. The request will contain a description of the intended change with supplementary or revised Drawings and Specifications as applicable, and the projected time for accomplishing the change.

2. The CONTRACTOR may propose a change in the Work by submittal of a Change Order request to the RESIDENT PROJECT REPRESENTATIVE describing the proposed change with a statement of the reason for the change and the effect on the Contract times and price, along with supporting documentation.

B. Execution of a request for a Change Order Proposal:

1. When a proposal is requested for changed work, submit proposal within 14 days following receipt of the request from OWNER or RESIDENT PROJECT REPRESENTATIVE. State the increase or decrease, if any, in Contract Completion times and Contract Price.
2. Explain proposal in sufficient detail to permit review by OWNER.
3. For omitted work, the decrease in the Contract Price will be determined by the RESIDENT PROJECT REPRESENTATIVE and will include appropriate amounts for profit and overhead.
4. The OWNER and RESIDENT PROJECT REPRESENTATIVE will review the proposal and may request additional information and documentation. Provide these items upon request.
5. If the OWNER decides to proceed with the change, the OWNER will issue a Change Order for signature first by the CONTRACTOR and then by the OWNER.
6. The CONTRACTOR will promptly complete the approved change in the Work on receipt of the executed Change Order.
 - a. Failure to sign the Change Order does not relieve the CONTRACTOR from performing the Work if the Change Order is signed by the OWNER.

C. Execution of a change order request:

1. The OWNER and RESIDENT PROJECT REPRESENTATIVE will review the request and may request additional information and documentation. Provide these items upon request.
2. For omitted work, the decrease in the Contract Price will be determined by the RESIDENT PROJECT REPRESENTATIVE and will include appropriate amounts for profit and overhead.
3. If the OWNER decides to proceed with the change, the OWNER will issue a Change Order for signature first by the CONTRACTOR and then by the OWNER.

4. The CONTRACTOR will promptly complete the approved change in the Work on receipt of the executed Change Order.
 - a. Failure to sign the Change Order does not relieve the CONTRACTOR from performing the Work if the Change Order is signed by the OWNER.
- D. Compute the cost of both additive and deductive changes in the Work in accordance with Article 11 of the General Conditions and as follows:
 1. Include the costs of labor crew foreman and general foreman performing or directly supervising the changed Work on the site. Include travel and subsistence, but only to the extent incurred.
 2. To the labor cost add all net premium for Workman's Compensation, taxes pursuant to the Federal Social Security Act, and payments required under State and Federal unemployment laws.
 3. Add necessary extra materials, delivered at the site.
 4. Include rent for plant and equipment at unit rental costs for similar rentals from an independent firm (i.e. a firm which is not owned in whole or in part by the CONTRACTOR). If equipment is owned by CONTRACTOR or rented from a firm in which the CONTRACTOR has an interest, calculate the rent in accordance with the applicable provisions and terms of the current "Cost Reference Guide for Construction Equipment" published by Dataquest.

1.4 WORK CHANGE DIRECTIVES

- A. Initiation by OWNER: OWNER may issue a Work Change Directive with a Notice to Proceed without a prior request for a Change Order Proposal or the CONTRACTOR's signature.
- B. Payment Determination: The OWNER will designate the method of determining the amount of compensation or credit, if any, based on one of the methods contained in Article 15 of the General Conditions.
- C. Timing: Proceed with the change in the Work immediately upon receipt of the Work Change Directive.
- D. Addition to Contract: The Work Change Directive Orders will be incorporated into the Contract Documents via a Change Order at a later date.

1.5 FIELD ORDERS

- A. The RESIDENT PROJECT REPRESENTATIVE may issue a written order at any time during the course of construction.
- B. Field Orders serve as documentation of minor changes in the work not involving a change in the Contract Price or Times.
- C. Proceed with the change described in the Field Order immediately upon receipt of the field order.
- D. Field orders will be delivered to CONTRACTOR's on-site representative and are effective upon receipt.
- E. If CONTRACTOR is of the opinion that the field order affects either the contract price or time, CONTRACTOR shall provide written notice to RESIDENT PROJECT REPRESENTATIVE within 48 hours of receiving the field order.
- F. During Field Order Work, CONTRACTOR to maintain daily time and material records that are signed off by Resident Project Representative. These records are to be submitted to OWNER when requested.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

CHANGE ORDER FORM

CHANGE ORDER NO. _____

OWNER: Waukesha Water Utility

DATE: _____

PROJECT: _____

CONTRACTOR: _____

THE FOLLOWING CHANGES ARE HEREBY MADE TO THE CONTRACT DOCUMENTS:

DESCRIPTION:

REASON FOR CHANGE:

<u>CONTRACT PRICE</u>	<u>CONTRACT TIME</u>	
	<u>Substantial Completion Date</u>	<u>Final Completion Date</u>
ORIGINAL:	ORIGINAL:	
PREVIOUS C.O.s:	PREVIOUS C.O.s:	
THIS C.O. Add / Deduct:	THIS C.O.:	
REVISED CONTRACT PRICE:	REVISED CONTRACT TIME:	

It is agreed by the Contractor that this Change Order includes any and all costs associated with or resulting from the change(s) ordered herein, including all impact, delays and acceleration costs. Other than the dollar amount and time allowance listed above, there shall be no further time or dollar compensation as a result of this Change Order.

THIS DOCUMENT WILL BECOME AN AMENDMENT TO THE CONTRACT AND ALL
STIPULATIONS AND COVENANTS OF THE CONTRACT SHALL APPLY HERETO.

Waukesha Water Utility:

BY: _____
Name, Title

Date

Contractor

BY: _____
Name, Title

Date

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 29 00

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Schedule of Values
- B. Application for Payment
- C. Contract Items
- D. Allowance Items

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, referred to as the "State Specifications"

1.3 SCHEDULE OF VALUES

- A. Approval of Schedule: Submit for approval a preliminary schedule of values, in duplicate, for the Work. Prepare preliminary schedule of values in accordance with Paragraph 2.03 of the General Conditions. Submit preliminary schedule of values within 10 calendar days after date established in Notice to Proceed. Submit final schedule of values in accordance with Paragraph 2.05 of the General Conditions.
- B. Format: Utilize a format similar to the Bid Form. Identify each line item with number and title in accordance with the Contract Items listed in this Section. Identify site mobilization, bonds and insurance. Include within each line item, a direct proportional amount of CONTRACTOR's overhead and profit.
- C. Revisions: With each Application for Payment revise schedule to list approved Change Orders.

1.4 APPLICATION FOR PAYMENT

- A. Required Copies: Submit three copies of each application on EJCDC Form C-620 Contractors Application for Payment or approved equal in accordance with General Conditions 15.01. Present required information in typewritten form or on

electronic media printout. Use data from approved Schedule of Values and include the following items with each Application for Payment:

1. Certified Statement / Sworn affidavit
 2. Pay request
 3. Waivers
 4. Certificate of payroll
 5. Subcontract payment details
 6. Updated construction schedule.
 7. Survey coordinates and elevations in .dwg base files signed and sealed by a land surveyor registered in the State of Wisconsin of the items specified in this Section for which payment is being requested in accordance with the requirements of Section 01 78 00. Identify the location of the area for which the .dwg record data is being submitted, such as by street name or area map. Revise .dwg base files based on comments provided and include revisions marked in proceeding submittals.
 8. Red lines of "Record Drawings" updated for the Work for which payment is being requested in accordance with the requirements of Section 01 78 00.
 9. A separate schedule for Materials Stored showing line item, description, previous value received, value incorporated into the Work and present value. Include a bill of sale, invoice, or other documentation in the Application for Payment warranting that OWNER has received the materials and equipment free and clear of Liens, and evidence that the materials and equipment are covered by property insurance, a warehouse bond, or other arrangements to protect OWNER's interest therein. Materials and equipment stored offsite must be stored in a licensed, bonded warehouse and subject to inspection by the RESIDENT PROJECT REPRESENTATIVE with one working day's notice.
 10. A list of each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of Work.
- B. Submit application for payment to RESIDENT PROJECT REPRESENTATIVE on, or before, the first of each month.
- C. Execute certification by signature of authorized officer.
- D. The payment will be reduced by the amount of the retainage set forth in the contract agreement.

- E. Final Payment: Prepare Application for Final Payment as required in Paragraph 15.06 of the General Conditions.

1.5 CONTRACT ITEMS

A. Contract Item 1 – Mobilization and Demobilization

1. Description: Under the Contract Item for Mobilization and Demobilization, furnish labor, materials, equipment and services to perform those operations necessary for the movement of personnel, equipment, supplies, project sign, preconstruction videos, and incidentals to and from the project site, for establishment of temporary offices, buildings, safety equipment, sanitary facilities and first aid supplies as required by the specifications and state and local law and regulations, and implementing security requirements. Include the costs of bonds and any required insurance, costs for obtaining applicable permits, and any other pre-construction or post-construction expense necessary to the start or completion of the Work, excluding the cost of construction materials, under this Contract Item. Include the cost of other Work as shown and specified that is not specifically included under other Contract Items under this Contract Item.
2. Payment: Payment for Mobilization and Demobilization will be made at the lump sum price bid for Contract Item 1 according to the following schedule. Any remaining amount will be paid upon completion of the Work on the Project, including final punch list Work items. Payment will be limited to four percent of the original Computed Price for the Project.

Percent of Original Computed Price Earned*	Allowable Percent of the Lump Sum price for Mobilization and Demobilization
0	** Cost of bonds
5	Balance of first 50%
10	Balance of first 80%
95	Remaining 20% for Demobilization

*Work installed and not including materials stored.

**As verified by receipted invoice.

B. Contract Item 2 – Maintenance of Traffic

1. Description: Under the Contract Item for Maintenance of Traffic, furnish labor, materials, equipment, and services to provide Maintenance of Traffic in accordance to the requirements of Section 643 of the State Specifications and as shown, specified, or directed.
2. Payment: Payment for Maintenance of Traffic will be made at the lump sum price for Contract Item 2 multiplied by the percent of the original Computed Price earned.

C. Contract Items 3A, 3B, and 3C – Ductile Iron Return Flow Pipeline (Open Cut)

1. Description: Under the Contract Items for Ductile Iron Return Flow Pipeline (Open Cut), furnish labor, materials, equipment, and services to provide the Return Flow Pipeline as shown, specified, or directed.

The Work includes laying schedule; alignment survey layout and construction staking; clearing and grubbing; removal of trees, shrubs, and other plantings; root pruning; pavement saw cutting and removal in accordance with Sections 204 and 205 of the State Specifications; excavation; sheeting, shoring, and bracing; removal of water; pipe, fittings, and appurtenances; pipework and jointing; gaskets; joint continuity bonding; tracer wire; tracer boxes; polyethylene encasement; pipe bedding; backfill, consisting of common fill (Contract Items 3A), select fill (Contract Item 3B), and flowable fill (Contract Item 3C); compaction; geotextile fabric; insulation; marking tape; concrete encasement; electrical current isolation pieces; temporary fencing; survey for record drawings; compliance with permits; televising existing sanitary and storm sewers and laterals within the City of Waukesha; dust control; sweeping; temporary and nonpermanent pavement; temporary support, protection, repair, replacement, and coordination for existing utilities, including sanitary sewers and services, water main, storm sewers and culverts, underdrains, drain tiles, gas lines, high voltage electric cables, utility poles, and other utilities; reconstruction of ditches/swales; re-grading and restoration of access areas and haul roads; removal and disposal of surplus excavated material; monitoring structures and utilities for settlement; protection of existing structures; protection and replacement of surface features, including fences and mailboxes; temporary blow-offs; testing; water for testing; installation and removal of plugs, bulkheads, and caps; pipeline interface to adjoining contract packages; global navigation satellite system receiver; placing the new Return Flow Pipeline in service; and other Work, materials, equipment, and easement requirements necessary for the construction of the Return Flow Pipeline complete in place as shown, specified, and directed.

Merge costs of the various classes of pipe shown or specified into the unit price per linear foot for Contract Items 3A, 3B, and 3C. Merge costs for high density polyethylene (HDPE) pipe installed by open cut construction beneath ANR-owned steel gas pipelines into the unit price per linear foot for Contract Items 3A, 3B, and 3C.

The Work does not include restoration of lawn, landscape, wetland, or agricultural areas damaged or destroyed as a result of the Work; permanent pavement; curb and gutter; butterfly valves; blow-off assemblies and pipeline branches to blow-off assemblies; air valve assemblies and pipeline outlets to air valve assemblies; vaults; additional earth excavation, rock excavation, common fill, select fill, flowable fill, and pipe bedding; crossings installed via horizontal directional drilling, including HDPE pipe,

ductile iron reducers, and HDPE adapters, unless a longer crossing is provided than shown; crossings installed via jacking and boring, including steel casing pipes and ductile iron carrier pipes; pipeline closure to adjoining Return Flow Pumping Station; and other Work that will be paid for under other Contract Items.

2. Measurement for Payment: The length of the Ductile Iron Return Flow Pipeline (Open Cut) to be measured for payment under Contract Items 3A, 3B, and 3C will be the actual linear feet of ductile iron or HDPE pipe, fittings, adapters and specials installed via open cut construction, measured along a horizontal projection of the centerline of the pipe, with no deduction for the length of valves or other appurtenances. The measured length will include fittings, but will not include the length of crossings installed by trenchless construction, including via horizontal directional drilling, unless a longer crossing is provided than shown, and jacking and boring, which will be paid for under separate Contract Items.
3. Payment: Payment for the Ductile Iron Return Flow Pipeline (Open Cut) will be made at the Contract unit prices per linear foot for Contract Items 3A, 3B, and 3C as follows:
 - a. Contract Item 3A: Ductile Iron Return Flow Pipeline (Open Cut), 30-Inch, Common Fill
 - b. Contract Item 3B: Ductile Iron Return Flow Pipeline (Open Cut), 30-Inch, Select Fill
 - c. Contract Item 3C: Ductile Iron Return Flow Pipeline (Open Cut), 30-Inch, Flowable Fill

D. Contract Item 4 – 36-Inch HDPE Return Flow Pipeline (Horizontal Directional Drilling)

1. Description: Under the Contract Item for 36-Inch HDPE Return Flow Pipeline (Horizontal Directional Drilling), furnish labor, materials, equipment, and services to provide the Return Flow Pipeline in crossings installed by horizontal directional drilling as shown, specified, or directed.

The Work includes laying schedule; alignment survey layout and construction staking; preparation of borehole plans; for entry and exit pits, clearing and grubbing, removal of trees, shrubs, and other plantings, root pruning, pavement removal in accordance with Sections 204 and 205 of the State Specifications, excavation, sheeting, shoring, and bracing, backfill, and geotextile fabric; removal of water; pipe, fittings, and appurtenances, including HDPE pipe, ductile iron reducers, and HDPE adapters; establishing boreholes; reaming; skids and rails; containment of spoil and drilling fluids; pipework and jointing; gaskets; connections to adjacent new Ductile Iron Return Flow Pipeline; joint continuity bonding; tracer wire;

polyethylene encasement; temporary fencing; survey for record drawings; compliance with permits; protection, repair, and replacement of existing sanitary sewers and services, water main, storm sewers and culverts, underdrains, drain tiles, gas lines, high voltage electric cables, and other utilities; removal and disposal of surplus excavated material; monitoring structures and utilities for settlement; protection of existing structures; protection and replacement of surface features, including fences and mailboxes; temporary blow-offs; testing; water for testing; installation and removal of plugs, bulkheads, and caps; and other Work, materials, and equipment necessary for the construction of the Return Flow Pipeline segments installed via horizontal directionally drilling complete in place as shown, specified, and directed.

The Work does not include excavation, pipe bedding, backfill, and appurtenant Work necessary for construction of the pipeline installed in open cut trenches and other similar construction within payment limits shown; insulation; restoration of lawn, landscape, wetland, or agricultural areas damaged or destroyed as a result of the Work; permanent pavement; curb and gutter; crossings installed via jacking and boring; and other Work that will be paid for under other Contract Items.

2. Measurement for Payment: The length of 36-Inch HDPE Return Flow Pipeline (Horizontal Directional Drilling) to be measured for payment under Contract Item 4 will be the actual linear feet of pipe, fittings, adapters, and specials placed, measured along a horizontal projection of the centerline of the pipe and as follows:
 - a. If a shorter crossing is provided than shown, the length of 36-Inch HDPE Return Flow Pipeline (Horizontal Directional Drilling) to be measured for payment will be the actual linear feet of pipe, fittings, adapters, and specials placed. The remainder of the crossing shown will be measured for payment under Contract Item 3A, 3B, or 3C.
 - b. If a longer crossing is provided than shown, the additional length of 36-Inch HDPE Return Flow Pipeline (Horizontal Directional Drilling) will be measured for payment under Contract Item 3A, 3B, or 3C.
3. Payment: Payment for 36-Inch HDPE Return Flow Pipeline (Horizontal Directional Drilling) will be made at the Contract unit price per linear foot for Contract Item 4.

- E. Contract Items 5A, 5B, and 5C – Ductile Iron Return Flow Pipeline in Steel Casing (Jacking and Boring)
 1. Description: Under Contract Items 5A, 5B, and 5C for Ductile Iron Return Flow Pipeline in Steel Casing (Jacking and Boring), furnish labor, materials, equipment, and services to provide the Return Flow Pipeline in casing pipe at crossings by jacking and boring as shown, specified, or directed.

The Work includes alignment survey layout and construction staking; jacking and receiving pits, including clearing and grubbing, removal of trees, shrubs, and other plantings, root pruning, pavement removal in accordance with Sections 204 and 205 of the State Specifications, excavation, sheeting, shoring, and bracing, backfill, and geotextile fabric; removal of water; casing and carrier pipe, fittings, and appurtenances; pipework and jointing; gaskets; connections to adjacent new Ductile Iron Return Flow Pipeline; joint continuity bonding; tracer wire; polyethylene encasement; jacking; casing spacers; grout; end seals; railroad flagging operations; temporary fencing; survey for record drawings; compliance with permits; protection, repair, and replacement of existing sanitary sewers and services, water main, storm sewers and culverts, underdrains, drain tiles, gas lines, high voltage electric cables, and other utilities; removal and disposal of surplus excavated material; monitoring structures and utilities for settlement; protection of existing structures; protection and replacement of surface features, including fences and mailboxes; temporary blow-offs; testing; water for testing; installation and removal of plugs, bulkheads, and caps; and other Work, materials, and equipment necessary for the construction of the Return Flow Pipeline segments installed via jacking and boring complete in place as shown, specified, and directed.

Merge costs of the various classes of pipe shown or specified into the unit price per linear foot for Contract Items 5A, 5B, and 5C.

The Work does not include excavation, pipe bedding, backfill, and appurtenant Work necessary for construction of the pipeline installed in open cut trenches and other similar construction within payment limits shown; insulation; restoration of lawn, landscape, wetland, or agricultural areas damaged or destroyed as a result of the Work; permanent pavement; curb and gutter; crossings installed via horizontal directional drilling; and other Work that will be paid for under other Contract Items.

2. Measurement for Payment: The length of Ductile Iron Return Flow Pipeline in Steel Casing (Jacking and Boring) to be measured for payment under Contract Items 5A, 5B, and 5C will be the actual length placed in linear feet measured along a horizontal projection of the centerline of the casing pipe.
3. Payment: Payment for Ductile Iron Return Flow Pipeline in Steel Casing (Jacking and Boring) will be made at the Contract unit price per linear foot for Contract Items 5A, 5B, and 5C as follows:
 - a. Contract Item 5A: Ductile Iron Return Flow Pipeline in Steel Casing (Jacking and Boring), 30-inch, Road
 - b. Contract Item 5B: Ductile Iron Return Flow Pipeline in Steel Casing (Jacking and Boring), 30-inch, Sentry Dr. and Canadian National Railroad

- c. Contract Item 5C: Ductile Iron Return Flow Pipeline in Steel Casing (Jacking and Boring), 30-inch, Sunset Dr. and Canadian National Railroad

F. Contract Items 6A, 6B, 6C, and 6D – Butterfly Valves

- 1. Description: Under Contract Items 6A, 6B, 6C, and 6D for Butterfly Valves, furnish labor, materials, equipment and services to provide Butterfly Valves as shown, specified, or directed.

The Work includes butterfly valves and appurtenances; jointing, including joint restraint, actuators, bolts and gaskets; polyethylene encasement; corporation stops; for Contract Items 6B and 6C, select fill bedding for vaults, vaults, manhole frame and cover, and pipe supports; for Contract Item 6C, pressure gauge, pressure transmitter, and appurtenant equipment; for Contract Item 6D, PLC panel, switch, cellular communication equipment, programming, integration, shop drawings, factory testing, field testing, startup, as-built drawings, operation and maintenance manuals, and training; valve boxes; valve pads; I.D. plates; survey for record drawings; testing; and other Work necessary for the construction of the Butterfly Valves complete in place as shown, specified, and directed.

The Work does not include clearing and grubbing; removal of trees, shrubs, and other plantings; root pruning; pavement removal; excavation; sheeting, shoring, and bracing; removal of water; pipe, fittings, and appurtenances; joint continuity bonding; tracer wire; pipe bedding; backfill; geotextile fabric; insulation; marking tape; restoration of lawn, landscape, wetland, or agricultural areas damaged or destroyed as a result of the Work; permanent pavement; curb and gutter; and other Work that will be paid for under other Contract Items.

- 2. Measurement for Payment: The quantities of Butterfly Valves to be measured for payment under Contract Items 6A, 6B, and 6C will be the actual number of each type of butterfly valve placed, as shown and specified, completed, and accepted.
- 3. Payment: Payment for Butterfly Valves will be made at the Contract unit price for each valve for Contract Items 6A, 6B, and 6C and at the pre-negotiated lump sum price for Contract Item 6D as follows:
 - a. Contract Item 6A: Butterfly Valves, 30-Inch, Direct Buried
 - b. Contract Item 6B: Butterfly Valves, 30-Inch, In Vault
 - c. Contract Item 6C: Butterfly Valves, 30-Inch, In Vault with Pressure Transmitter

- d. Contract Item 6D: Butterfly Valves, Process Control System Integration

G. Contract Items 7A and 7B – Air Valve Assemblies

- 1. Description: Under the Contract Items 7A and 7B for Air Valve Assemblies, furnish labor, materials, equipment, and services to provide Air Valve Assemblies as shown, specified, or directed.

The Work includes air valves; vent pipe, fittings, and appurtenances; connections to pipeline and pipeline sections and outlets to air valve assemblies; butterfly valves; pipework and jointing; gaskets; select fill bedding for vaults; vaults; manhole frame and cover; pipe supports; I.D. plates; survey for record drawings; testing; and other Work necessary for the construction of the Air Valve Assemblies complete in place as shown, specified, and directed.

For buried vent pipe, fittings, and appurtenances, the Work includes clearing and grubbing; removal of trees, shrubs, and other plantings; root pruning; pavement removal in accordance with Sections 204 and 205 of the State Specifications; excavation; sheeting, shoring, and bracing; removal of water; tracer wire; pipe bedding; backfill; geotextile fabric; marking tape; concrete encasement; compliance with permits; temporary and nonpermanent pavement; protection, repair, and replacement of existing sanitary sewers and services, water main, storm sewers, underdrains, gas lines, high voltage electric cables, and other utilities; removal and disposal of surplus excavated material; monitoring structures and utilities for settlement; protection of existing structures; protection and replacement of surface features, including fences and mailboxes; and other Work necessary for the construction of the vent pipe, fittings, and appurtenances for Air Valve Assemblies complete in place as shown, specified, and directed.

The Work does not include restoration of lawn, landscape, wetland, or agricultural areas damaged or destroyed as a result of the Work; permanent pavement; curb and gutter; other Work that will be paid for under other Contract Items; and the following:

- a. Ductile iron pipe, fittings, and appurtenances other than the pipeline sections, outlets, and butterfly valves between the pipeline and the air valve assemblies.
 - b. For vaults, clearing and grubbing; removal of trees, shrubs, and other plantings; root pruning; pavement removal; excavation; sheeting, shoring, and bracing; removal of water; backfill; and geotextile fabric.
- 2. Measurement for Payment: The quantities of Air Valve Assemblies to be measured for payment under Contract Items 7A and 7B will be the actual

number of each type of air valve assembly placed, as shown and specified, completed, and accepted.

3. Payment: Payment for Air Valve Assemblies will be made at the Contract unit price for each air valve assembly for Contract Items 7A and 7B as follows:
 - a. Contract Item 7A: Air Valve Assemblies, Type I
 - b. Contract Item 7B: Air Valve Assemblies, Type II

H. Contract Item 8 – Blow-Off Assemblies

1. Description: Under the Contract Item for Blow-Off Assemblies, furnish labor, materials, equipment, and services to provide Blow-Off Assemblies as shown, specified, or directed.

The Work includes clearing and grubbing; removal of trees, shrubs, and other plantings; root pruning; pavement removal in accordance with Sections 204 and 205 of the State Specifications; excavation; sheeting, shoring, and bracing; removal of water; blow-off pipe, fittings, gate valves, and appurtenances; branch fittings and connections to pipeline; pipework and jointing; gaskets; joint continuity bonding; tracer wire; polyethylene encasement; valve boxes; valve pads; I.D. plates; pipe bedding; backfill; geotextile fabric; insulation; marking tape; concrete encasement; temporary fencing; survey for record drawings; compliance with permits; temporary and nonpermanent pavement; protection, repair, and replacement of existing sanitary sewers and services, water main, storm sewers, underdrains, gas lines, high voltage electric cables, and other utilities; removal and disposal of surplus excavated material; monitoring structures and utilities for settlement; protection of existing structures; protection and replacement of surface features, including fences and mailboxes; temporary blow-offs; testing; water for testing; installation and removal of plugs, bulkheads, and caps; and other Work necessary for the construction of the Blow-Off Assemblies complete in place as shown, specified, and directed.

The Work does not include excavation, pipe bedding, backfill, and appurtenant Work necessary for construction of the pipeline installed in open cut trenches and other similar construction within payment limits shown other than the Work required for the Blow-Off Assemblies and branch fittings and connections between the pipeline and Blow-Off Assemblies; restoration of lawn, landscape, wetland, or agricultural areas damaged or destroyed as a result of the Work; permanent pavement; curb and gutter; and other Work that will be paid for under other Contract Items.

2. Measurement for Payment: The quantity of Blow-Off Assemblies to be measured for payment under Contract Item 8 will be the actual number of

Blow-Off Assemblies placed as shown and specified, completed, and accepted.

3. Payment: Payment for Blow-Off Assemblies will be made at the Contract unit price for each blow-off assembly for Contract Item 8.

I. Contract Item 9 – Cathodic Protection

1. Description: Under the Contract Item for Cathodic Protection, furnish labor, materials, equipment, and services to provide Cathodic Protection as shown, specified, or directed.

The Work includes anodes; test stations; terminal board connections; reference electrodes; wires and cables; exothermic welding; I.D. plates; survey for record drawings; services of a Cathodic Protection (CP) Technician; testing; and other Work necessary for the construction of the Cathodic Protection complete in place as shown, specified, and directed.

The Work does not include clearing and grubbing; removal of trees, shrubs, and other plantings; root pruning; pavement removal; excavation; sheeting, shoring, and bracing; removal of water; pipe, fittings, and appurtenances; joint continuity bonding; electrical current isolation pieces; tracer wire; pipe bedding; backfill; geotextile fabric; insulation; marking tape; restoration of lawn, landscape, wetland, or agricultural areas damaged or destroyed as a result of the Work; permanent pavement; curb and gutter; and other Work that will be paid for under other Contract Items.

2. Payment: Payment for Cathodic Protection will be made at the lump sum price for Contract Item 9 multiplied by the percent of the original Computed Price earned up to a maximum of 90% of the lump sum price for Contract Item 9. Payment for the remainder of Contract Item 9 will be made after successful completion of post-installation testing as specified in Section 33 05 58 Cathodic Protection.

J. Contract Item 10 – Base Course

1. Description: Under the Contract Item for Base Course, furnish labor, materials, equipment, and services to provide aggregate base courses in accordance to the requirements of Sections 305 and 350 of the State Specifications and local requirements and as shown, specified, or directed.
2. Measurement for Payment: The quantity of Base Course to be measured for payment under Contract Item 10 will be the actual tons of Base Course permanently placed within the payment limits as shown and specified, completed, and accepted.
3. Payment: Payment for Base Course will be made at the Contract unit price per ton for Contract Item 10.

K. Contract Items 11 – Road Pavement

1. Description: Under the Contract Items for Road Pavement, furnish labor, materials, equipment, and services to provide road pavement replacement in accordance to the requirements of Section 415 and 450 of the State Specifications and local requirements and as shown, specified, or directed.
2. Measurement for Payment: The quantity of Road Pavement to be measured for payment under Contract Item 11A will be the actual tons of Road Pavement permanently placed within the payment limits as shown and specified, completed, and accepted. The quantity of Road Pavement to be measured for payment under Contract Items 11B, 11C, 11D, and 11E will be the actual square yards of Road Pavement permanently placed within the payment limits as shown and specified, completed, and accepted.
3. Payment: Payment for Road Pavement will be made at the Contract unit price per ton for Contract Item 11A and the Contract unit price per square yard for Contract Items 11B, 11C, 11D, and 11E as follows:
 - a. Contract Item 11A: Road Pavement, Asphalt
 - b. Contract Item 11B: Road Pavement, 8-Inch Concrete
 - c. Contract Item 11C: Road Pavement, 9-Inch Concrete
 - d. Contract Item 11D: Road Pavement, 10-Inch Concrete
 - e. Contract Item 11E: Road Pavement, Mill and Overlay

L. Contract Item 12 – Final Pavement Markings

1. Description: Under the Contract Item for Final Pavement Markings, furnish labor, materials, equipment, and services to provide pavement markings in accordance with the requirements of Section 646 of the State Specifications and local requirements as shown, specified, or directed.
2. Payment: Payment for Final Pavement Markings will be made at the lump sum price for Contract Item 12 multiplied by the percent of the original Computed Price earned.

M. Contract Item 13 – Curb and Gutter

1. Description: Under the Contract Item for Curb and Gutter, furnish labor, materials, equipment, and services to provide curb and gutter replacement in accordance to the requirements of Section 601 of the State Specifications and local requirements as shown, specified, or directed.

2. Measurement for Payment: The quantity of Curb and Gutter to be measured for payment under Contract Item 13 will be the actual linear feet of Curb and Gutter permanently placed within the payment limits as shown and specified, completed, and accepted.
3. Payment: Payment for Curb and Gutter will be made at the Contract unit price per linear foot for Contract Item 13.

N. Contract Item 14 – Pedestrian Pavement

1. Description: Under the Contract Items for Pedestrian Pavement, furnish labor, materials, equipment, and services to provide pedestrian pavement replacement in accordance to the requirements of Section 602 of the State Specifications and local requirements as shown, specified, or directed.
2. Measurement for Payment: The quantity of Pedestrian Pavement to be measured for payment under Contract Item 14A will be the actual tons of Pedestrian Pavement permanently placed within the payment limits as shown and specified, completed, and accepted. The quantity of Pedestrian Pavement to be measured for payment under Contract Items 14B will be the actual square yards of Pedestrian Pavement permanently placed within the payment limits as shown and specified, completed, and accepted.
3. Payment: Payment for Pedestrian Pavement will be made at the Contract unit price per ton for Contract Item 14A and the Contract unit price per square yard for Contract Item 14B as follows:
 - a. Contract Item 14A: Pedestrian Pavement, Asphalt
 - b. Contract Item 14B: Pedestrian Pavement, Concrete Sidewalk

O. Contract Items 15A and 15B – Driveway Pavement

1. Description: Under the Contract Items for Driveway Pavement, furnish labor, materials, equipment, and services to provide driveway pavement replacement in accordance to the requirements of Section 416 and 450 of the State Specifications and local requirements as shown, specified, or directed.
2. Measurement for Payment: The quantity of Driveway Pavement to be measured for payment under Contract Item 15A will be the actual tons of Driveway Pavement permanently placed within the payment limits as shown and specified, completed, and accepted. The quantity of Driveway Pavement to be measured for payment under Contract Items 15B will be the actual square yards of Driveway Pavement permanently placed within the payment limits as shown and specified, completed, and accepted.

3. Payment: Payment for Driveway Pavement will be made at the Contract unit price per ton for Contract Item 15A and the Contract unit price per square yard for Contract Item 15B as follows:

- a. Contract Item 15A: Driveway Pavement, Asphalt
- b. Contract Item 15B: Driveway Pavement, Concrete

P. Contract Item 16 – Erosion and Sedimentation Control

1. Description: Under the Contract Item for Erosion and Sedimentation Control, furnish labor, materials, equipment, and services to provide erosion and sedimentation control and slope protection to support construction of the pipeline in accordance with Federal, State, and local regulations and as shown, specified, or directed. The Work includes installation, maintenance, replacement and removal of approved erosion and sediment control and slope protection devices from commencement to final acceptance.
2. Payment: Payment for Erosion and Sedimentation Control will be made at the lump sum price for Contract Item 16 multiplied by the percent of the original Computed Price earned.

Q. Contract Items 17 – Landscape, Wetland, and Agricultural Restoration

1. Description: Under the Contract Item for Landscape, Wetland, and Agricultural Restoration, furnish labor, materials, equipment, and services to replace and maintain areas disturbed or damaged by construction activities not located under pavement and appurtenant Work as shown, specified, or directed, excluding the restoration area within I-43 Right-of-Way which is accounted for under Contract Item 21. The Work includes providing topsoil; seed; sod; protection, storage, and replacement of trees, shrubs, and other plantings; fertilizer; water; and other Work, materials and equipment necessary to restore areas disturbed or damaged by construction activities not located under pavement complete in place as shown, specified, and directed.
2. Measurement for Payment: The quantity of Landscape, Wetland, and Agricultural Restoration to be measured for payment under Contract Item 17 will be the actual square yards of land restored, excluding the restoration area within I-43 Right-of-Way, within the payment limits shown and specified, completed, and accepted. Merge costs for landscape, wetland, and agricultural restoration done beyond the payment limits shown into the unit price per square yard for Contract Item 17.
3. Payment: Payment for Landscape, Wetland, and Agricultural Restoration will be made at the Contract unit price per square yard for Contract Item 17.

R. Contract Item 18 – Disposal of Impacted Soil and Groundwater

1. Description: Under the Contract Item for Disposal of Impacted Soil and Groundwater, furnish labor, materials, equipment, and services to load, transport, and dispose offsite at an approved licensed landfill impacted soil as shown, specified, or directed.

The Work includes loading, transporting, and disposing of impacted soil; disposing of impacted groundwater or water from within the excavation or groundwater drawn from dewatering operations in accordance with procedures approved by or acceptable to the municipality receiving the effluent; water metering equipment required by municipalities; and compliance with Federal, State, and local regulations. Work includes document manifests, landfill fees, and testing.

The Work does not include clearing and grubbing; removal of trees, shrubs, and other plantings; root pruning; pavement removal; excavation; sheeting, shoring, and bracing; removal of water; pipe bedding; backfill; obtaining applicable permits; restoration of lawn, landscape, wetland, or agricultural areas damaged or destroyed as a result of the Work; permanent pavement; curb and gutter; and other Work that will be paid for under other Contract Items.

2. Measurement for Payment: The quantity of Disposal of Impacted Soil and Groundwater to be measured for payment under Contract Item 18 will be the actual tons (1 ton equals 2,000 pounds) of material loaded, transported, and delivered to the approved licensed landfill for disposal shown as specified, completed, and accepted. Merge costs of disposing of impacted groundwater into the unit price per ton for Contract Item 18. Furnish copies of completed disposal manifests, weight tickets, and receipt of material documents from the landfill.
3. Payment: Payment for Disposal of Impacted Soil and Groundwater will be made at the Contract unit price per ton for Contract Item 18.

S. Contract Item 19 – HDPE Conduit for Fiber Optic Communication

1. Description: Under the Contract Items for HDPE Conduit for Fiber Optic Communication, furnish labor, materials, equipment, and services to provide the HDPE conduit and handholes for fiber optic communication as shown, specified, or directed.

The Work includes HDPE conduit without fiber optic cable; marking tape; handholes; locatable pull wire; and marker posts. For HDPE conduit in dedicated trenches outside of pipeline trenches, the Work includes clearing and grubbing; removal of trees, shrubs, and other plantings; root pruning; pavement removal in accordance with Sections 204 and 205 of the State Specifications; excavation; sheeting, shoring, and bracing; removal of water; backfill; geotextile fabric; marking tape; survey for record drawings; compliance with permits; temporary and nonpermanent pavement;

protection, repair, and replacement of existing sanitary sewers and services, water main, storm sewers, underdrains, gas lines, high voltage electric cables, and other utilities; removal and disposal of surplus excavated material; monitoring structures and utilities for settlement; protection of existing structures; protection and replacement of surface features, including fences and mailboxes; and other Work necessary for the construction of the HDPE Conduit for Fiber Optic Communication complete in place as shown, specified, and directed.

The Work does not include fiber optic cable; excavation, pipe bedding, backfill, and appurtenant Work necessary for construction of the pipeline installed in open cut trenches and other similar construction within payment limits shown other than the Work required for the HDPE Conduit for Fiber Optic Communication between the pipeline and hand holes; restoration of lawn, landscape, wetland, or agricultural areas damaged or destroyed as a result of the Work; permanent pavement; curb and gutter; fiber optic connections; integration; and other Work that will be paid for under other Contract Items.

2. Measurement for Payment: The length of HDPE Conduit to be measured for payment under Contract Item 19A will be the actual linear feet of conduit placed, measured along a horizontal projection of the centerline of the pipeline, with no deduction for the length of valves or other appurtenances and no addition for connections to handholes. The measured length will include the length installed by open cut construction and by trenchless construction. The quantity of Polymer-Concrete Handholes to be measured for payment under Contract Item 19B will be the actual number of handholes placed, as shown and specified, completed, and accepted.
3. Payment: Payment for HDPE Conduit will be made at the Contract unit price per linear foot for Contract Item 19A. Payment for Polymer-Concrete Handholes will be made at the Contract unit price for each handhole placed for Contract Item 19B.

T. Contract Item 20A – Additional Quantities, Earth Excavation

1. Description: Under the Contract Item for Additional Quantities, Earth Excavation, perform additional earth excavation if unsuitable materials are found in excavations within the payment limits shown, as authorized in writing, and as specified.

The Work includes excavation; sheeting, shoring, and bracing; removal of water; compliance with permits; protection, repair, and replacement of existing sanitary sewers and services, water main, storm sewers, underdrains, gas lines, high voltage electric cables, and other utilities; removal and disposal of surplus excavated material; monitoring structures and utilities for settlement; protection of existing structures; protection and

replacement of surface features; and other Work necessary to the additional excavation as specified and directed.

The Work does not include rock excavation; common fill; select fill, flowable fill; pipe bedding; and other Work that will be paid for under other Contract Items.

2. Measurement for Payment: The quantity of Additional Quantities, Earth Excavation to be measured for payment under Contract Item 20A will be the total excavation in cubic yards, as authorized, within the payment limits shown and beyond the established lines and grades which would have controlled and been maintained had not the additional excavation been authorized. Merge costs for earth excavation done beyond the payment limits shown into the unit price per cubic yard for Contract Item 20A. Unauthorized additional earth excavation will not be measured or paid for.
3. Payment: Payment for Additional Quantities, Earth Excavation will be made at the Contract unit price per cubic yard for Contract Item 20A.

U. Contract Item 20B – Additional Quantities, Rock Excavation

1. Description: Under the Contract Item for Additional Quantities, Rock Excavation, excavate, to established lines and grades as shown rock encountered in construction of pipelines installed in open cut trench and other similar construction within the payment limits shown as authorized in writing and as specified.

The Work includes rock excavation; sheeting, shoring, and bracing; removal of water; offsite disposal of excavated rock; compliance with permits; protection, repair, and replacement of existing sanitary sewers and services, water main, storm sewers, underdrains, gas lines, high voltage electric cables, and other utilities; removal and disposal of surplus excavated material; monitoring structures and utilities for settlement; protection of existing structures; protection and replacement of surface features; and other Work necessary to the additional excavation as specified and directed.

- a. Notify the RESIDENT PROJECT REPRESENTATIVE a sufficient time in advance of the beginning of additional rock excavation in writing, so that sufficient elevations and measurements may be obtained. No payment will be made for any additional rock material excavated or removed before these measurements have been taken.

The Work does not include additional earth excavation; additional common fill, select fill, flowable fill, or pipe bedding; and other Work that will be paid for under other Contract Items.

2. Measurement for Payment: The quantity of Additional Quantities, Rock Excavation to be measured for payment under Contract Item 20B will be the

actual volume in cubic yards of rock excavated, as authorized, measured in place within the payment limits shown and specified. Merge costs for rock excavation done beyond the payment limits shown into the unit price per cubic yard for Contract Item 20B. Unauthorized additional rock excavation will not be measured or paid for.

3. Payment: Payment for Additional Quantities, Rock Excavation will be made at the Contract unit price per cubic yard for Contract Item 20B.

V. Contract Items 20C, 20D, 20E, and 20F – Additional Quantities, Backfill, Pipe Bedding, and Encasement

1. Description: Under the Contract Items for Additional Quantities, Backfill, Pipe Bedding, and Encasement, furnish, transport, place and compact additional select fill, flowable fill, pipe bedding, and Class D concrete encasement within the payment limits shown as authorized in writing and as specified. Earth or rock excavation for placement of additional backfill, pipe bedding, or encasement will be paid under Contract Items 20A and 20B.
2. Measurement for Payment: The quantities of Additional Quantities, Backfill, Pipe Bedding, and Encasement to be measured for payment under Contract Items 20C, 20D, 20E, and 20F will be the volume in cubic yards of select fill, flowable fill, pipe bedding, or Class D concrete encasement material, as authorized, measured in place within the payment limits shown and beyond the established lines and grades which would have controlled and been maintained had not the additional backfill, pipe bedding, or encasement been authorized. Merge costs for backfill and pipe bedding done beyond the payment limits shown into the unit price for the appropriate contract item. Material used to fill voids resulting from unauthorized excavation, or where required for removal of water, will not be measured for payment even though its use is authorized. Unauthorized additional backfill, pipe bedding, or concrete encasement will not be measured or paid for.
3. Payment: Payment for Additional Quantities, Backfill, Pipe Bedding, and Encasement will be made at the Contract unit price per cubic yard for Contract Items 20C, 20D, 20E, and 20F as follows:
 - a. Contract Item 20C: Additional Quantities, Select Fill
 - b. Contract Item 20D: Additional Quantities, Flowable Fill
 - c. Contract Item 20E: Additional Quantities, Pipe Bedding
 - d. Contract Item 20F: Additional Quantities, Class D Concrete Encasement

W. Contract Item 20G – Additional Quantities, Geotextile Fabric

1. Description: Under the Contract Item for Additional Quantities, Geotextile Fabric, furnish labor, materials, equipment, and services to provide additional geotextile fabric authorized in writing as shown, specified, or directed.
2. Measurement for Payment: The quantity of Additional Quantities, Geotextile Fabric to be measured for payment under Contract Item 20G will be the actual geotextile fabric placed in square feet, as authorized, beyond the established limits of geotextile fabric which would have controlled and been maintained had not the additional geotextile fabric been authorized. Unauthorized additional geotextile fabric will not be measured or paid for.
3. Payment: Payment for Additional Quantities, Geotextile Fabric will be made at the Contract unit price per square foot for Contract Item 20G.

X. Contract Item 20H – Additional Quantities, Polystyrene Insulation

1. Description: Under the Contract Item for Additional Quantities, Polystyrene Insulation, furnish labor, materials, equipment, and services to provide additional polystyrene insulation authorized in writing as shown, specified, or directed.
2. Measurement for Payment: The quantity of Additional Quantities, Polystyrene Insulation to be measured for payment under Contract Item 20H will be the actual polystyrene insulation placed in square feet, as authorized, beyond the established limits of polystyrene insulation shown which would have controlled and been maintained had not the additional polystyrene insulation been authorized. Unauthorized additional polystyrene insulation will not be measured or paid for.
3. Payment: Payment for Additional Quantities, Polystyrene Insulation will be made at the Contract unit price per square foot for Contract Item 20H.

Y. Contract Item 20I – Additional Quantities, Groundwater Barriers

1. Description: Under the Contract Item for Additional Quantities, Groundwater Barriers, furnish labor, materials, equipment, and services to provide additional groundwater barriers authorized in writing as shown, specified, or directed.
2. Measurement for Payment: The quantity of Additional Quantities, Groundwater Barriers to be measured for payment under Contract Item 20I will be the actual number of groundwater barriers placed, as authorized, beyond the number of groundwater barriers shown which would have controlled and been maintained had not the additional groundwater barriers been authorized. Unauthorized additional groundwater barriers will not be measured or paid for.

3. Payment: Payment for Additional Quantities, Groundwater Barriers will be made at the Contract unit price for each groundwater barrier for Contract Item 20I.

Z. Contract Items 21 – Landscape Restoration within I-43 Right-of-Way

1. Description: Under the Contract Item for Landscape Restoration within I-43 Right-of-Way, furnish labor, materials, equipment, and services to replace and maintain areas disturbed or damaged by construction activities within the I-43 right-of-way not located under pavement and appurtenant Work as shown, specified, or directed. The Work includes providing topsoil; seed; protection, storage, and replacement of trees, shrubs, and other plantings; fertilizer; water; and other Work, materials and equipment necessary to restore areas disturbed or damaged by construction activities not located under pavement complete in place as shown, specified, and directed.
2. Payment: Payment for Landscape Restoration within I-43 Right-of-Way will be made at the lump sum price for Contract Item 21 multiplied by the percent of the total linear feet of pipe placed within the I-43 right-of-way.

AA. Contract Items 22A and 22B – Resident Project Representative's Field Office

1. Description: Under the Contract Item for Resident Project Representative's Field Office, furnish labor, materials, equipment, and services to provide the field office for the RESIDENT PROJECT REPRESENTATIVE and appurtenant Work as shown, specified, or directed. The Work includes providing a field office trailer; clearing and grubbing; aggregate parking area; utility connections; maintenance and cleaning; and other Work, materials and equipment necessary for 12 months or when the Work is completed, whichever is less, as shown, specified, and directed.
2. Payment: Payment for Resident Project Representative's Field Office will be made at the lump sum price for Contract Item 22A multiplied by the percent of the original Computed Price earned. Payment for One Additional Month of Resident Project Representative's Field Trailer Operation and Maintenance will be made at the Contract unit price for each additional month beyond 12 months for Contract Item 22B.

1.6 ALLOWANCE ITEMS

A. Allowance Items A1 and A2 – Disposal of Unforeseen Impacted Materials

1. Description: Under the Allowance Items for Disposal of Unforeseen Impacted Materials, furnish labor, materials, equipment, and services to remove, handle, treat, or dispose of hazardous waste impacted material uncovered during construction and identified as hazardous based on sampling and testing by the ENGINEER's Consultants as specified and directed.

Upon determining that a certain extent of the soil and groundwater is identified as hazardous, submit the following in accordance with Division 0:

- a. A scope of Work for the additional Work required, a price proposal for the incremental cost, and supporting documentation for review and approval. Include a detailed description of the type and extent of additional Work to be performed for the removal, handling, treatment, and legal disposal of hazardous material, as required, and a detailed cost breakdown showing material, labor and equipment costs. The incremental cost is defined as the cost of removal, handling, treatment, and disposal of impacted soil (Allowance Item A1) and groundwater (Allowance Item A2) in accordance with the requirements of Section 02 50 00 beyond the cost of removal, handling, and disposal of a corresponding quantity of non-hazardous material that is considered part of the Computed Price for the Project under other Contract Items. The Work for these Allowance Items does not include the labor, materials, equipment, and services to load, transport and dispose of the quantity of impacted soil associated with Contract Item 18 as specified in Section 02 50 00.

During the performance of the Work, maintain a daily record of time, material and equipment utilized to perform the Work, signed by the RESIDENT PROJECT REPRESENTATIVE and keep the RESIDENT PROJECT REPRESENTATIVE apprised of the Work schedule.

2. Payment: Payment for the Disposal of Unforeseen Impacted Materials will be made for the Work completed as part of the approved scope of Work(s) for Allowance Items A1 and A2 as follows:
 - a. Allowance Item A1: Disposal of Unforeseen Impacted Materials, Soil
 - b. Allowance Item A2: Disposal of Unforeseen Impacted Materials, Groundwater

Include the allowance amounts indicated in Section 00 41 00 Bid Form in the Computed Price for the Project. The actual cost of the Work may be less or more than indicated in Section 00 41 00 Bid Form. It is also possible that this Work may not be required, in which case the amount to be paid under these Allowance Items will be zero. Actual payments will be based solely on the amount approved.

In the event that the actual price for additional Work to be performed for the removal, handling, treatment and offsite disposal, as required, of impacted material exceeds the amount in these Allowance Items, provide the extra Work required due to the presence of impacted materials as

change order Work. In this case, submit supplemental report(s), price proposal(s), and supporting documentation for review and approval in accordance with Division 0.

B. Allowance Item A3 – Unforeseen Landscape, Wetland, and Agricultural Restoration

1. Description: Under the Allowance Item for Unforeseen Landscape, Wetland, and Agricultural Restoration, furnish labor, materials, equipment, and services to replace and maintain unforeseen areas, trees, shrubs, or other vegetation disturbed or damaged by construction activities not located under pavement and appurtenant Work as specified and directed.

Upon authorization in writing, submit the following in accordance with Division 0:

- a. A scope of Work for the additional Work required, a price proposal for the incremental cost, and supporting documentation for review and approval. Include a detailed description of the type and extent of additional Work to be performed and a detailed cost breakdown showing material, labor and equipment costs. The incremental cost is defined as the cost for landscape, wetland, or agricultural restoration beyond the cost of landscape, wetland, or agricultural restoration that is considered part of the Computed Price for the Project under Contract Items 17 and 21.

During the performance of the Work, maintain a daily record of time, material and equipment utilized to perform the Work, signed by the RESIDENT PROJECT REPRESENTATIVE and keep the RESIDENT PROJECT REPRESENTATIVE apprised of the Work schedule.

2. Payment: Payment for Unforeseen Landscape, Wetland, and Agricultural Restoration will be made for the Work completed as part of the approved scope of Work(s) for Allowance Item A3.

Include the allowance amount indicated in Section 00 41 00 Bid Form in the Computed Price for the Project. The actual cost of the Work may be less or more than indicated in Section 00 41 00 Bid Form. It is also possible that this Work may not be required, in which case the amount to be paid under this Allowance Item will be zero. Actual payments will be based solely on the amount approved.

In the event that the actual price for additional Work to be performed for landscape, wetland, or agricultural restoration exceeds the amount in this Allowance Item, provide the extra Work authorized in writing as change order Work. In this case, submit supplemental report(s), price proposal(s),

and supporting documentation for review and approval in accordance with Division 0.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 31 00

COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination
- B. Preconstruction Conference
- C. Progress Meetings
- D. Outreach and Notifications Planning

1.2 COORDINATION

- A. General: Coordinate scheduling, submittals, and Contract work to assure efficient and orderly sequence of installation of interdependent construction elements.

1.3 PRECONSTRUCTION CONFERENCE

- A. General: Prior to commencement of the Work, in accordance with paragraph 2.04 of the General Conditions, the OWNER will conduct a preconstruction conference to be held at a predetermined time and place.
- B. Delineation of Responsibilities: The purpose of the conference is to designate responsible personnel, to establish a working relationship among the parties and to identify the responsibilities of the OWNER, ENGINEER, RESIDENT PROJECT REPRESENTATIVE, and the CONTRACTOR. Matters requiring coordination will be discussed and procedures for handling such matters, established. The agenda will include:
 - 1. Submittal procedures
 - 2. Requests for Information
 - 3. Partial Payment procedures
 - 4. Maintenance of Records
 - 5. Schedules and sequencing
 - 6. Safety and First Aid responsibilities
 - 7. Change Orders
 - 8. Use of site
 - 9. Security and Housekeeping procedures
 - 10. Material and equipment delivery
 - 11. Testing procedures

12. Erosion control plan
 13. Maintenance of Traffic
 14. Construction permits
 15. Liquidated damages
 16. Coordination with local municipalities
 17. Outreach and Notifications Planning and Delivery
- C. Attendees: The preconstruction conference is to be attended by the representatives of the CONTRACTOR, the OWNER, the ENGINEER, and the RESIDENT PROJECT REPRESENTATIVE who will be associated with the project. Required attendance shall include the superintendent designated for the project, engineer in charge of inspection and their principal staff, utilities representatives, and representatives of the OWNER. The Canadian National Railway Company, City of New Berlin, City of Waukesha, Town of Waukesha, Waukesha County, Wisconsin Department of Natural Resources, Wisconsin and Southern Railroad, and the Wisconsin Department of Transportation will be invited to this meeting at the discretion of OWNER. Representatives of subcontractors, and principal suppliers may also attend when appropriate.
- D. Chair and Minutes: The preconstruction conference will be chaired by the RESIDENT PROJECT REPRESENTATIVE who will also arrange for the keeping and distribution of minutes to all attendees.

1.4 PROGRESS MEETINGS

- A. Meeting Frequency and Format: Schedule progress meetings on at least a weekly basis or more frequently as warranted by the complexity of the Project, to review the Work, discuss outreach and notifications, changes in schedules, maintain coordination and resolve potential problems. Invite OWNER, ENGINEER, RESIDENT PROJECT REPRESENTATIVE, and all subcontractors. The Canadian National Railway Company, City of New Berlin, City of Waukesha, Town of Waukesha, Waukesha County, Wisconsin Department of Natural Resources, Wisconsin and Southern Railroad, and the Wisconsin Department of Transportation will be invited to this meeting at the discretion of OWNER. Suppliers may be invited as appropriate. Minutes of the meeting will be maintained by CONTRACTOR and reviewed by RESIDENT PROJECT REPRESENTATIVE prior to distribution by the CONTRACTOR. Distribute reviewed minutes to attendees within three (3) working days after each meeting. Advise the CONTRACTOR of any exceptions taken to the meeting notes within five (5) working days of receipt of the meeting notes. Lack of response will be construed as acceptance of the meeting notes as prepared.
- B. Meeting Location: The progress meetings will occur at the RESIDENT PROJECT REPRESENTATIVE's job trailers located near the intersection of Les Paul Parkway and Broadway Avenue.

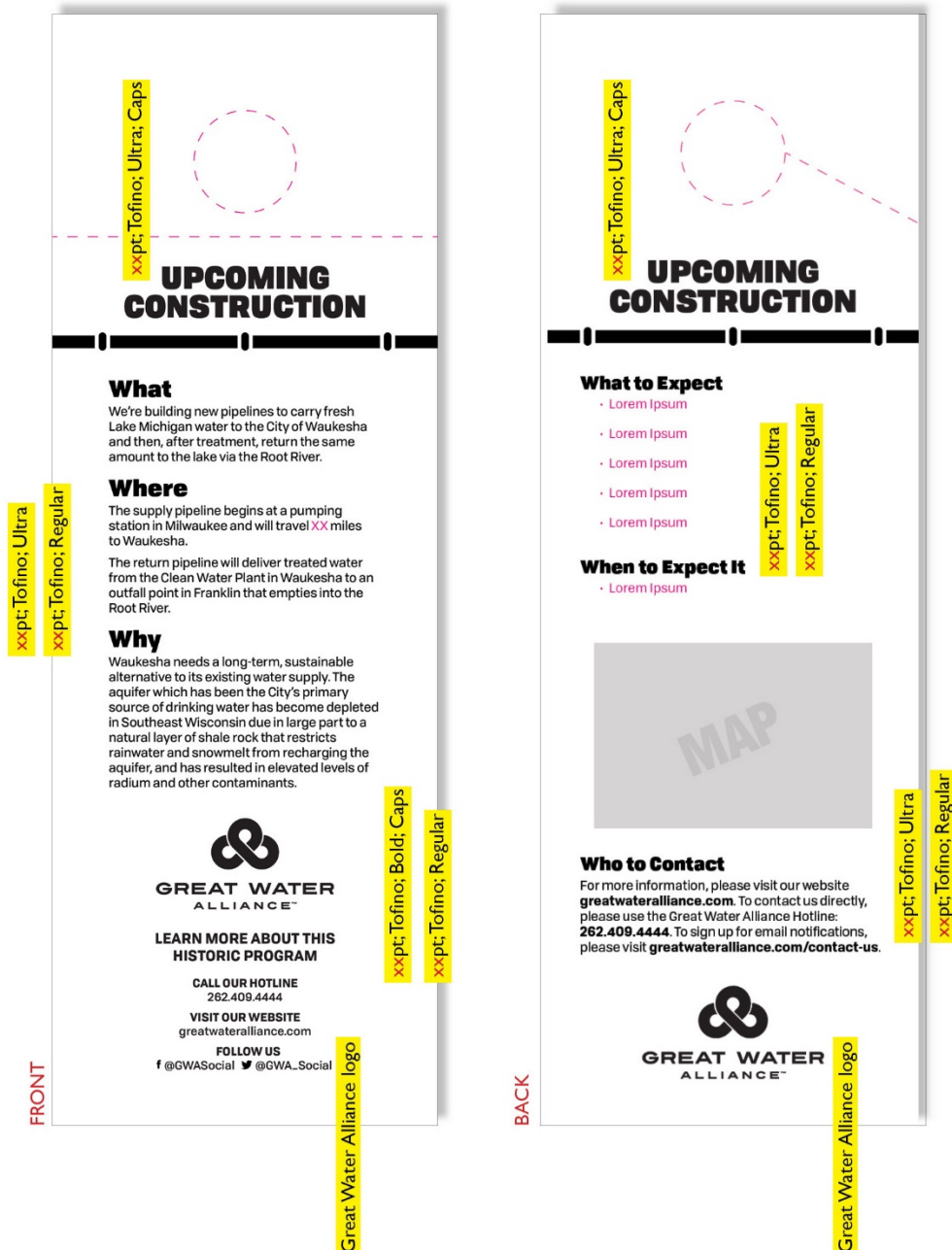
1.5 PUBLIC OPEN HOUSES

- A. General: Within 60 days of NOTICE TO PROCEED and after the CONTRACTOR has submitted the schedule for construction, the OWNER will conduct public open houses to present the project to impacted communities, proposed construction schedule, and answer community member questions.
- B. Attendees: The open houses are to be attended by representatives of the CONTRACTOR that will engage the public during the open houses. The required CONTRACTOR attendance will include the project manager and up to two additional support staff.
- C. Open Houses: The following open houses will be held in the communities listed below. The venues and time will be determined by the OWNER in conjunction with the communities and provided to the CONTRACTOR.
 - 1. City of Waukesha
 - 2. City of New Berlin

1.6 OUTREACH AND NOTIFICATIONS PLANNING

- A. Utilize the Construction Outreach and Notifications Checklist Template at the end of this section to develop the approach and schedule for outreach and notification activities. This shall be undertaken in coordination with the OWNER and RESIDENT PROJECT REPRESENTATIVE. The Outreach and Notifications Checklist is to be completed by the CONTRACTOR following the provided template. An electronic version of the template will be provided by the RESIDENT PROJECT REPRESENTATIVE.
- B. The Outreach and Notification Checklist is to be completed for a maximum pipeline stationing length of 5,000 linear feet at a time. Provide to the RESIDENT PROJECT REPRESENTATIVE at least five (5) weeks prior to the start of construction at each location where construction activity is scheduled to occur.
- C. Provide updated Outreach and Notifications Checklist forms at each progress meeting. Implement the Outreach and Notifications plan as per 1.6.B and the Construction Outreach and Notifications Checklist Template.
- D. Participate in two preconstruction Outreach and Notifications Planning and Implementation workshops with the OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE.
 - 1. The initial workshop will occur within 45 days of the issuance of the Notice to Proceed. This will be an outreach orientation to review the construction schedule, initial traffic control plans, communication protocols and existing and potential local issues. It is required that the CONTRACTOR will attend.

2. The second workshop will include the CONTRACTOR, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE and will cover the expectations, roles, responsibilities and outreach protocols for the project.
- E. Notify property owners of upcoming construction impacts by using door hangers.
1. Door hanger content relating to specific construction impacts to be prepared by the CONTRACTOR utilizing the provided template below. Provide the RESIDENT PROJECT REPRESENTATIVE with draft content at least four (4) weeks prior to distribution for approval.
 2. The door hanger shall be printed on weatherproof 14 mil. plastic template.
 3. The door hanger shall be 4" x 12" with a 1-1/8" die cut hole and slit.
 4. The CONTRACTOR shall distribute and maintain the door hanger until the project is completed and accepted. The door hanger shall be distributed at locations described at 1.5.D and as directed by the RESIDENT PROJECT REPRESENTATIVE.
 5. Unless otherwise directed, all versions of the door hanger shall become the property of the OWNER upon completion of the project.
 6. No direct payment will be made for the project door hangers. All costs for the door hangers are incidental to the Contract.
 7. Input all information deemed relevant by the OWNER for notifications to property owners and other stakeholders.
 8. Print the door hangers using the template provided in 1.6.C.9 and using one of three (3) approved printers:
 - a. Wild Impact Marketing
 - b. Scan Group
 - c. Exacta Graphics
 9. Door hanger template:



F. CONTRACTOR to deliver all notifications under the following methodology:

1. For notifications, the CONTRACTOR will use the supplied door hanger template provided at 1.6.C.9. The door hanger will be left at a legal and visible location.
2. Notify all property owners in writing on both sides of the public right-of-way a minimum of 14 days prior to any street closure in advance of construction

as to when, how they will be affected, and the duration of impact in their vicinity. CONTRACTOR is responsible for obtaining the addresses of the affected property owners.

- a. When construction impacts or restricts the through-movement of traffic at signal-controlled intersections, the notification zone shall be expanded to include residents, businesses, and public facilities up to 1,500 feet from the route.
3. Notify property owners in writing by door hanger a minimum of three (3) working days prior to closing driveways and/or restricting access to their property, with a follow up notification a minimum of one (1) working day prior to restricting access, and a follow up notification after access to the property has been fully restored.
4. Track delivery of all printed notifications through an app such as Map My Run. CONTRACTOR to provide these notification maps to the RESIDENT PROJECT REPRESENTATIVE to verify that impacted communities and stakeholders have been appropriately notified.
- G. CONTRACTOR to be available for any externally requested stakeholder meeting, such as a Parent Teacher Association (PTA), community or neighborhood association meetings, or for query and complaints handling. The CONTRACTOR shall allow for up to four (4) meetings.
- H. CONTRACTOR to assist the OWNER with responding to any immediate query or complaints (e.g. a property calling the Program's hotline regarding loss of access).
- I. CONTRACTOR to collaborate with the OWNER in managing up to 2 milestone events, such as groundbreakings or media and stakeholder tours. The CONTRACTOR will be provided notice of any milestone event and shall be responsible for site access, security, safety and site preparation and cleanup.
- J. CONTRACTOR will not comment or speak on behalf of the OWNER to the media or any other external party during the course of the project.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.



Construction Outreach and Notifications Checklist Template

FIVE WEEKS PRIOR TO CONSTRUCTION				
Contractor:	Please select one:			
Package:	Please select one:			
Construction Limits:	STREET INTERSECTION:		to:	
Stationing:			to:	
Project Description:				
Project Manager:	NAME:	PH#:	EMAIL:	
Site Manager:	NAME:	PH#:	EMAIL:	
City:	Please select one:			
Anticipated Construction Start:				
Anticipated Construction End:				
Actual Construction Start:				
Actual Construction End:				
Construction Completion Substantial:				
Construction Completion Final:				
Construction Staging Location(s):				
Construction Methodologies:	Please select one:			
Construction Impacts Considerations:	Impact	Y/N	Address	Date(s)
	Traffic Lane Closure			
	Intersection Closing			
	Emergency Services			
	Community Services			
	Retail			
TWO WEEKS PRIOR TO CONSTRUCTION				
Notifications	Notice Type:	Y/N		
	14-Day			
	3-Day			
	1-Day			
	Other (please describe)			
Notifications Map Attached?				
If answer is no, please describe reason(s):				
Contractor's Approval	NAME:	DATE:		
Resident Project Representative Approval	NAME:	DATE:		

END OF SECTION

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SECTION 01 31 25

PROJECT MANAGEMENT INFORMATION SYSTEM

PART 1 GENERAL

1.1 SUMMARY

- A. All correspondence and documentation required by the Contract shall be transmitted between the CONTRACTOR and the RESIDENT PROJECT REPRESENTATIVE in accordance with the requirements of this Section.
- B. The CONTRACTOR shall use PMWeb® Project Management System (PMWeb) to exchange information and track all project correspondence. PMWeb is an Internet/Web-based project management software used to exchange information and correspondence required by the Contract in an electronic environment. Documents that require hardcopy originals shall be scanned into PMWeb when completed.
- C. Use of this project management system will not replace or change terms of the Contract.
- D. Each project team member of the CONTRACTOR including, but not limited to: Project Manager, Project Engineer, and Superintendent and any other personnel or subcontractor(s) designated by the CONTRACTOR that will correspond directly with the RESIDENT PROJECT REPRESENTATIVE on behalf of the CONTRACTOR, shall have access to the Internet and have an e-mail address in order to communicate with various project team members. The CONTRACTOR shall provide confirmation of these conditions and the names, positions, and e-mail addresses to the RESIDENT PROJECT REPRESENTATIVE. Training of these individuals for use of the software will be provided by the RESIDENT PROJECT REPRESENTATIVE. The software contains user manuals, and there are several venues for assistance after training. RESIDENT PROJECT REPRESENTATIVE shall coordinate with the CONTRACTOR to select a date for training within thirty (30) days from Notice-to-Proceed.

PART 2 PRODUCTS

2.1 SOFTWARE AND HARDWARE REQUIREMENTS

- A. For users designated by the CONTRACTOR, the RESIDENT PROJECT REPRESENTATIVE will provide 2 concurrent (shared) user licenses for user access to the PMWeb website. Software licenses for use of the software by each of the CONTRACTOR's designated users shall be paid by the RESIDENT PROJECT REPRESENTATIVE.

User licensing period shall commence on the date of Notice to Proceed and shall terminate six (6) months after Notice of Final Completion.

- B. The CONTRACTOR shall maintain in its field office(s): computers and other necessary equipment for inputting and retrieving documents from the electronic document environment for the mutual use by the CONTRACTOR, his subcontractor(s), the OWNER, the ENGINEER and the RESIDENT PROJECT REPRESENTATIVE staff.
- C. The CONTRACTOR shall procure high speed internet access for computers located in the CONTRACTOR's and RESIDENT PROJECT REPRESENTATIVE's field office(s).
- D. Additional information on PMWeb may be obtained via the Internet, at www.bv.PMWeb.com/PMWeb or by contacting the RESIDENT PROJECT REPRESENTATIVE directly.

PART 3 EXECUTION

3.1 SYSTEM MANAGEMENT AND USE

- A. The RESIDENT PROJECT REPRESENTATIVE will administer the PMWeb user accounts.
- B. All costs associated with utilizing this system, not specifically designated to be covered by the RESIDENT PROJECT REPRESENTATIVE, including computer hardware and high-speed internet access and the training time for CONTRACTOR's employees or subcontractors, are the responsibility of the CONTRACTOR, for the full term of this Contract and are incidental to the Contract. The CONTRACTOR will not be eligible for any "extra" costs which may be claimed as necessary to comply with the requirements of this Section, including Change Order Requests and/or contract Time Extensions.

3.2 COMMUNICATIONS PROCESS

- A. Written project communication shall take place in PMWeb by creating and distributing documents and correspondence items directly within the system, or by manually entering into the system the dates and descriptions of items to track over time.
- B. All documents requiring formal signatures shall be signed by an agent of the CONTRACTOR, duly authorized, and any authorized agent of required Subcontractors. Hard copy ink signatures or electronic signatures are acceptable to the OWNER. In order to obtain authorized electronic signatures within PMWeb, the CONTRACTOR and all agents shall provide their electronic signatures to the RESIDENT PROJECT REPRESENTATIVE's PMWeb Administrator so that this

process may be completed electronically. The signed hard copies (or electronic documents) shall be scanned and stored in PMWeb. Examples of documents requiring formal signatures include but are not limited to: certification statements of Payment Requests, Certified Payroll, Change Orders and contract Time Extensions. The actual signature sheets of these documents will be forwarded to the OWNER for storage, not required for electronically submitted documents.

- C. Enter Submittals, General Correspondence Letters, CONTRACTOR Field Memos, Change Order Requests, Request for Information (RFIs), Logs, Meeting Agendas, Meeting Minutes, Daily Reports, and other correspondence and required documents in PMWeb.
- D. Samples, by their nature, cannot be transmitted electronically, and will be distributed in the traditional manner but tracked in PMWeb. PMWeb will be used to track and expedite the processing of items that do not lend themselves to being in an electronic environment.
- E. Support documentation in hard copy format for any document in PMWeb to be scanned into an electronic file and attached in PMWeb to the document.
- F. The CONTRACTOR may distribute copies of prints, documents, reports, etc. in the traditional manner for field use, outside the system.

END OF SECTION

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SECTION 01 32 17

PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Scheduling Responsibilities
- B. Submittals
- C. Network Requirement
- D. Cost Loading
- E. Progress of the Work
- F. Schedule Updates
- G. Coordinating Progress Schedule With Other Contract Schedules
- H. Schedule Software Settings and Restrictions

1.2 SCHEDULING RESPONSIBILITIES

- A. Format: Use the Critical Path Method (CPM) to schedule and monitor job progress. Provide all information concerning sequencing logic and duration of all activities as well as the initial CPM logic network diagram and tabulated report data. CONTRACTOR to provide OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE copies of the initial schedule and subsequent updates in both .XER and .XML formats compatible with the latest version of Primavera P6 PM.
- B. Initial Submittal: Within 10 days after the Notice to Proceed, submit the initial logic network diagram to the ENGINEER and RESIDENT PROJECT REPRESENTATIVE for review. The OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE will review the initial schedule submittal and provide comments to the CONTRACTOR. Within 10 days following receipt of comments, submit final network diagram as required in paragraphs 2.05 of the General Conditions.
- C. Updates: On a monthly basis, furnish to the ENGINEER and RESIDENT PROJECT REPRESENTATIVE updated information on logic, percent complete, actual start and finish date and direction changes. Distribute copies at Progress Meetings. A brief narrative shall accompany the updated information describing

any changes to Contract milestones, approach to construction activities, critical path activities, planned outages, and delays.

- D. Adherence: Schedule and direct forces in a manner that will allow for completion of the Work within the Contract time specified.
- E. Accuracy: Provide initial schedule and subsequent update information to reflect the best efforts of the CONTRACTOR and all subcontractors as to how they envision the Work to be accomplished. Similarly, all progress information must be an accurate representation of the CONTRACTOR's and subcontractor's actual performance. Complete Work under this Contract in accordance with the established CPM schedule.
- F. Cost of Revisions: At no additional cost to the OWNER, revise schedule when, in the judgement of the ENGINEER and RESIDENT PROJECT REPRESENTATIVE, it does not accurately reflect the actual execution of the Work.

1.3 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1.
- B. CPM Schedule:
 - 1. Mandatory milestones: Contract duration shall be equal to the time period between the Notice to Proceed and the completion of the Work in readiness for final payment. The following milestones are mandatory:
 - a. Notice to Proceed
 - b. Milestones, if any, as indicated in CONTRACTOR's Bid
 - c. Substantial completion as indicated in CONTRACTOR's Bid
 - d. Completion and readiness for final payment, as indicated in CONTRACTOR's Bid
 - 2. The following additional milestones are to be considered and incorporated into the progress schedule in accordance with the Contract, if applicable:
 - a. Permit constraints
 - b. Work shut down or outage milestone requirements
 - c. Coordination with other Contract milestones
 - d. Applicable phasing milestones

- e. Other milestones deemed appropriate by RESIDENT PROJECT REPRESENTATIVE.
3. Within 10 Days after the Notice to Proceed, submit to the ENGINEER and RESIDENT PROJECT REPRESENTATIVE printed paper copies of a proposed CPM network diagram and tabular reports for the first 90 days of the Work. Draw initial logic diagram, as described herein, and submit on sheets 22 inches by 34 inches. Include both procurement and construction activities. Schedule a review meeting with the OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE within 2 weeks of the initial schedule submission. Revise and resubmit the 90 day schedule until it is acceptable to the ENGINEER and RESIDENT PROJECT REPRESENTATIVE.
- a. Preliminary Progress Schedule shall:
 - (1) Illustrate a feasible schedule for completion of the Work within the contract times and milestones specified.
 - (2) Provide an elementary example of the schedules in the format to be used for the progress schedule.
 - (3) Include the activity code structure as indicated in Paragraph 1.9.G.2.
4. Within 10 Days after the Notice to Proceed, submit to the ENGINEER and RESIDENT PROJECT REPRESENTATIVE 3 sets of the proposed CPM logic diagram on sheets 22 inches by 34 inches and tabular reports for the entire Contract duration. Include both procurement and construction activities. Sort these tabular reports by total float and activity number. Provide a predecessor/successor report, and project calendar. Draw logic diagram as described. CONTRACTOR to provide OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE copies of the initial schedule and subsequent updates formats compatible with the latest version of Primavera P6 PM.
- a. Progress Schedule shall be to the level of detail acceptable to the OWNER, ENGINEER and RESIDENT PROJECT REPRESENTATIVE and shall include the following:
 - (1) Organization and structural breakdown of the Project
 - (2) Milestones and completion dates
 - (3) Type of work to be performed and the labor trades involved
 - (4) Purchase, manufacture and delivery activities for major materials and equipment

- (5) Preparation, submittal, and acceptance of shop drawings and material samples. For submittals on the critical path, at the time of submission mark transmittal in red with the words "Critical Path" as indicated in 1.3.C.
 - (6) Deliveries of OWNER-furnished equipment and/or materials, if applicable
 - (7) Acceptance required by regulatory agencies and/or other third parties
 - (8) Assignment of responsibility for each activity
 - (9) Access requirements of work areas
 - (10) Identification of interfaces and dependencies with preceding, concurrent and follow-on contractors
 - (11) Test, submittal of test reports and acceptance of test results
 - (12) Planning for phased or total acceptance by OWNER; including start up and commissioning
 - (13) Identification of any manpower, material and equipment restrictions
 - (14) Planned outages
5. Schedule a review meeting with the OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE within 10 days of its submission. Failure by the CONTRACTOR to submit an acceptable schedule to the ENGINEER and RESIDENT PROJECT REPRESENTATIVE may, at the OWNER's sole discretion, be cause for the withholding of any partial payment otherwise due under the Contract.
 6. Review of the Schedule by the ENGINEER and RESIDENT PROJECT REPRESENTATIVE will not constitute a representation by either the ENGINEER and/or RESIDENT PROJECT REPRESENTATIVE that the Work can be completed as shown on the Schedule.
- C. Submittals Schedule: In addition to the above scheduling requirements, submit a complete and detailed listing of anticipated submittals during the course of the Contract. Coordinate these submittals with those of subcontractors and suppliers. Identify each submittal by Contract drawing number and Specification section number. Show the anticipated submission due date for each submittal along with the date on which its return is required. For planning purposes, average review time for shop drawings will be 15 Business Days after receipt. Longer durations for review may be required and will not be considered a basis for a claim for

additional time or compensation. For submittals on the critical path, at the time of submission mark transmittal in red with the words "Critical Path".

1. Submit submittal schedule within 10 Days from the Notice to Proceed. Revise as required and incorporate the dates and review durations into the CPM Schedule.
- D. Electronic Progress Schedule format and reporting: the progress schedule shall be created using Primavera P6 scheduling software. CONTRACTOR shall use RESIDENT PROJECT REPRESENTATIVE's file-naming format as directed throughout the project.
1. Electronic schedule files shall be saved with .XML or .XER file extensions
 2. Primavera Project Manager setting for "Baseline Type" shall be used in the following manner:
 - a. Select <None> as the baseline type for the preliminary progress schedule submittal.
 - b. Once the preliminary and progress schedule are accepted, the baseline type shall be named <Initial Plan>.
 - c. Each subsequent progress schedule update shall set the baseline type to <Last Performance Update>.
 3. The data date for schedule calculation in the Preliminary Progress Schedule and Progress Schedule shall be set as the date of the Notice to Proceed unless otherwise specified by the RESIDENT PROJECT REPRESENTATIVE.

1.4 NETWORK REQUIREMENTS

- A. Diagram: Show in the network diagram the order and interdependence of activities and the sequence in which the Work is to be accomplished. The purpose of the network analysis diagram is to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of succeeding activities. Follow a time scaled precedence format. Time scale the detailed network diagram showing a continuous flow from left to right.
- B. Develop the schedule activities into two major groups - procurement activities and construction activities:
1. Include the following procurement activities as a minimum:
 - a. Permits
 - b. Easements

- c. Submittal items
- d. Approval of submittal items
- e. Fabrication and delivery of submittal items.

Tie each of the above procurement items logically to the correct construction activity in the overall CPM construction schedule.

- 2. Under construction activities section utilize physical work activities to describe how the job will be constructed.

C. Activity Durations: Break the work into activities with durations of 1 to 20 Days each, except for non-construction activities, such as procurement of materials and delivery of equipment, and other activities which may require longer durations. To the extent feasible, group activities related to a specific physical area of the project on the network for ease of understanding and simplification. The ENGINEER, RESIDENT PROJECT REPRESENTATIVE and OWNER will review the selection and number of activities.

- 1. For each activity on the network indicate the following:
 - a. A single duration, no longer than 20 Days (i.e., the single best estimate of the expected elapsed time considering the scope of work involved in the activity) expressed in Days. Include legal holidays observed by the OWNER and the Extreme Weather Float. For Extreme Weather Float, show the number of days, for each month, from Tables 2 and 3. Show critical path for the schedule.

<p style="text-align: center;">Table 1 Average Monthly Precipitation (inches) 10 year average 2008 – 2018 NOAA National Centers for Environmental Information, Annual Climatological Summaries</p>											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.38	1.79	2.21	4.44	3.46	4.57	3.25	3.23	2.58	3.04	2.09	2.34

<p>Table 2</p> <p>Average Number of Calendar Days with Precipitation of 0.25 Inches or More in a Single 24-hour Period 10 year average 2008 – 2018 NOAA National Centers for Environmental Information, Annual Climatological Summaries</p>											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4	4	5	7	6	6	5	5	4	5	4	5

<p>Table 3</p> <p>Average Number of Calendar Days with Temperature less than 0 °F or greater than 90 °F 10 year average 2008 – 2018 NOAA National Centers for Environmental Information, Annual Climatological Summaries</p>											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4	2	1	–	1	3	4	3	1	–	–	2

- b. Assign an activity I.D. number to each activity. The I.D. number will be numeric with a maximum of 5 digits.
 - c. Include a brief description of the activity. If this description is not definitive, a separate listing of each activity and a descriptive narrative may be required.
 - d. Cost load each activity, except for procurement activities, to indicate the total estimated costs of the activity. No activity shall exceed \$60,000 except for equipment items. Assign material costs to delivery activities.
 - e. Load each activity with the estimated work hours to be expended on each activity.
- D. Incomplete Schedule: Failure to include on the network any element of work required for the performance of this Contract does not excuse the CONTRACTOR from completing all Work required within the applicable completion time, notwithstanding the network review by the ENGINEER, the RESIDENT PROJECT REPRESENTATIVE or the OWNER.

1.5 COST LOADING

- A. Schedule of Values: Allocate a dollar value to each activity on the construction schedule as specified. Equipment or material delivery activities bearing cost shall be separate activities. Include in dollar value the cost of project management,

superintendence, labor, and a pro rata contribution to overhead and profit. The sum of the activities cost shall be equal to the total contract price, including approved change orders. In submitting cost data the CONTRACTOR affirms that it is not unbalanced and that the value assigned to each activity represents the CONTRACTOR's estimate of the actual costs of performing that activity.

- B. Documentation: If, in the opinion of the RESIDENT PROJECT REPRESENTATIVE, the cost data does not meet the requirements for a balanced Contract Price breakdown, present documentation to the RESIDENT PROJECT REPRESENTATIVE substantiating any cost allocation. If an activity on the construction schedule has been assigned a disproportionate allocation of direct costs, overhead and profit the cost allocations will be considered unbalanced.

1.6 RESOURCE LOADING

- A. Documentation: The CONTRACTOR shall build a resource (manpower) library within Primavera P6 and assign resources to each applicable Progress Schedule activity. Resource-loading shall determine the activity duration based on the assigned resource. The CONTRACTOR shall submit a resource analysis report produced from Primavera P6 in the form of a series of graphics showing the principal trades. The report shall show the number of man-days of effort for each month over the life of the Contract. The manpower requirements forecast shall be updated monthly and shall include the actual manpower used by trades as of the current report period and the manpower required to complete the Work.

1.7 PROGRESS OF THE WORK

- A. Delays to Critical Path: Whenever it becomes apparent from the current monthly CPM Schedule update that delays to the critical path have resulted and these delays are through no fault of the OWNER, ENGINEER, or RESIDENT PROJECT REPRESENTATIVE and hence, that the Contract completion date will not be met, or when so directed by the OWNER, take one or more of the following actions to improve the Completion Date at no additional cost to the OWNER.
 - 1. Increase construction labor in such quantities and crafts as will substantially eliminate the backlog of Work.
 - 2. Increase the number of working hours per shift, shifts per day, or days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.
 - 3. Reschedule activities to achieve maximum practical concurrence of accomplishment of activities, and comply with the revised schedule.
 - 4. Submit to the RESIDENT PROJECT REPRESENTATIVE for review, a written statement of the steps proposed to be taken to remove or arrest the

delay to the schedule. Failure to submit a written statement of the steps to be taken or failure to take such steps as required by the Contract, may result in the OWNER directing the level of effort in labor (trades), equipment, and work schedule (overtime, weekend and holiday work, etc.) to be employed by the CONTRACTOR in order to remove or arrest the delay to the critical path in the accepted schedule. Promptly provide such level of effort at no additional cost to the OWNER. In addition, should schedule delays persist, the CONTRACTOR's surety will be asked to attend meetings at which schedule is updated.

5. If the requirements of this provision are not complied with, the OWNER at the OWNER's sole discretion, will withhold, partially or in total, payments otherwise due for work performed under this Contract as stated in Paragraph 15.01.E of General Conditions. Any withholding of monies is not a penalty for noncompliance, but is an assurance to the OWNER that funds will be available to implement these requirements should the CONTRACTOR fail to do so.

1.8 SCHEDULE UPDATES

- A. Monthly Schedule Updates: Monthly schedule updates shall be part of the monthly progress meeting. Submit monthly progress schedule updates for the duration of the Contract on a date agreed to by OWNER, RESIDENT PROJECT REPRESENTATIVE, and the CONTRACTOR. The CONTRACTOR must provide the following information for each update at a minimum:
 1. Actual start and finished dates for all completed activities.
 2. Actual start dates for all started but uncompleted activities including remaining durations.
 3. Activity percent completion.
 4. Revised logic and changes in activity durations, cost assigned.
 5. Cost influent of change orders, if any.
 6. Revisions due to extension of time.
- B. Prior to each monthly progress meeting, CONTRACTOR shall prepare a complete and accurate report of current procurement and construction progress through the end of the update period, and a depiction of how CONTRACTOR plans to continue the Work to meet all contract completion dates. All network changes and status data agreed to during each progress meeting shall be considered as accepted by all meeting attendee's unless written notice of any exceptions is given within five calendar days after the meeting.

- C. Printouts and electronic layouts required as part of the Progress Schedule submittal and monthly updates are as follows:
1. Summary Schedule: One page milestone and summary schedule sorted by total float, early-start, early-finish;
 2. Detailed Project Schedule: organized by Work Breakdown Structure (WBS) or area of work; sorted by total float, early-start, early-finish;
 3. Critical Path Schedule: sorted based on the total float, early-start, and early-finish;
 4. 60-day Look Ahead Schedule: sorted by total float, early-start, early-finish;
 5. Activities in Progress: organized by WBS or area of work; sorted by total float, early-start, early-finish;
 6. Out-of-sequence Narrative: tabular narrative showing work performed out-of-sequence.
- D. Submittal shall also including the following:
1. Narrative report summarizing the milestones, critical path, project approach including phasing or use of crews, significant submittal and fabrication items, coordination or interface requirements, OWNER-provided items, and list of Subcontractors and vendors.
 2. Graphic reports including critical path report (longest path), summary schedule report, total Float report by early-start early-finish, look ahead report grouped by Work breakdown structure or project phasing, and cash flow projection. Cash flow projections include estimated cumulative cost curves based on early and late start dates and projection of monthly payments over the life of the project.
 3. The schedule, critical path, and look-ahead schedules shall be submitted on E (22" x 34") size paper
 4. The Progress Schedule File shall be submitted in an executable format, using Primavera Project Manager (P6) format, and PDF format on a USB drive or FTP/electronic delivery, as requested by the RESIDENT PROJECT REPRESENTATIVE.
 5. The narrative and graphic reports shall be provided on 8" x 11" paper and E-size plots respectively.
- E. For major network changes that cannot be agreed to during the progress meeting, CONTRACTOR shall submit the proposed changes for RESIDENT PROJECT REPRESENTATIVE's acceptance prior to inserting such changes into the

networks, fragnets, or schedule abstracts, provided they are submitted with a letter of transmittal. A fragnet is defined as a sequence of new activities and/or activity revisions that are proposed to be added to the existing schedule to demonstrate how project events have an impact on the schedule.

- F. Withholding of Payments: Failure to provide specified updated information or failure to attend progress meetings may result in the withholding of progress payments.
- G. Time Extensions: If in accordance with the provisions of Article 11 of the General Conditions, the OWNER and RESIDENT PROJECT REPRESENTATIVE finds that the CONTRACTOR is entitled to any extension of the Contract completion date under the provisions of the Contract, the OWNER's determination as to the total number of Days extension will be based upon the current accepted and updated CPM Schedule and on all data relevant to the extension. Such data shall be included in the next monthly updating of the schedule. Actual delays in activities which, according to the CPM Schedule, do not affect any contract completion date shown by the critical path in the network, do not have any effect on the Contract completion date or dates and therefore, will not be the basis for a change in Contract completion time.
- H. Schedule Adjustments: From time to time it may be necessary for the Contract schedule and completion time to be adjusted by the OWNER to reflect the effects of job conditions, acts or omissions of other contractors not directly associated with this Contract, weather, technical difficulties, strikes, unavoidable delays on the part of the OWNER or RESIDENT PROJECT REPRESENTATIVE, and other unforeseeable conditions. Under such conditions, the OWNER may direct the CONTRACTOR to reschedule the Work to reflect the changed conditions and may grant, in a Change Order, schedule extensions affecting the Contract completion time. No additional compensation will be made to the CONTRACTOR for such schedule adjustments if the Critical Path is unaffected.
- I. Weather Delays: During construction, the Resident Project Representative will obtain weather data from a reputable source and will maintain weather records.

Extreme Weather Conditions that affect the critical path of the progress schedule, in excess of the Extreme Weather Float, will be considered for an increase in Contract Times. For all Extreme Weather Events, submit to Resident Project Representative, within 72 hours of the weather impact date, a "Weather Delay Form" with a statement of the proposed time increase based on supporting relevant weather data. Use the form provided in this section.

Resident Project Representative will determine Contractor's entitlement to an increase in Contract Times as a result of weather delays based on the flow chart in Figure 1-01 32 17 and the data included in Tables 1, 2 and 3 of this section. Efficiencies gained as a result of favorable weather within a calendar month, where the actual number of days of Extreme Weather Conditions is less than the total number of days shown in Tables 2 and 3, will contribute to the available total float in the CPM Schedule and will not affect Contract Times.

For circumstances not covered by the flow chart, increases in Contract Times will be granted at the discretion of Owner.

Table 3 includes historical weather data for the average number of days recorded where temperature could be considered extreme. Not every day listed in Table 3 corresponds to an Extreme Weather Condition based on the Heat Index Apparent Temperature or Wind Chill Index.

Justification for an increase in Contract Times as a result of extreme temperature will be determined based on the Heat Index Apparent Temperature or Wind Chill Index using the formulas below. The Heat Index and Wind Chill Temperature limits for determining the extreme temperature event will be those listed in Figure 1-01 32 17.

Heat Index:

$$\begin{aligned} \text{HI} = & -42.379 + 2.04901523 \times T + 10.14333127 \times \text{RH} - 0.22475541 \times T \times \text{RH} - \\ & 0.00683783 \times T \times T - 0.05481717 \times \text{RH} \times \text{RH} + 0.00122874 \times T \times T \times \text{RH} + \\ & 0.00085282 \times T \times \text{RH} \times \text{RH} - 0.00000199 \times T \times T \times \text{RH} \times \text{RH} \end{aligned}$$

Where:

HI = Heat Index Expressed as an Apparent Temperature in Degrees Fahrenheit (°F)

T = Average Day Temperature in Degrees Fahrenheit (°F)

RH = Average Day Relative Humidity in Percent (%)

If the RH is less than 13% and the temperature is between 80 and 112 degrees Fahrenheit (°F), then the following adjustment is subtracted from HI:

$$\text{ADJUSTMENT} = [(13 - \text{RH})/4] \times \text{SQRT}\{[17 - \text{ABS}(T - 95)]/17\}$$

Where:

HI = Heat Index Expressed as an Apparent Temperature in Degrees Fahrenheit (°F)

T = Average Day Temperature in Degrees Fahrenheit (°F)

RH = Average Day Relative Humidity in Percent (%)

SQRT = Square Root Function

If the RH is greater than 85% and the temperature is between 80 and 87 degrees Fahrenheit (°F), then the following adjustment is added to HI:

$$\text{ADJUSTMENT} = [(\text{RH} - 85)/10] \times [(87 - T)/5]$$

Where:

HI = Heat Index Expressed as an Apparent Temperature in Degrees Fahrenheit (°F)

T = Average Day Temperature in Degrees Fahrenheit (°F)

RH = Average Day Relative Humidity in Percent (%)

Wind Chill Index:

$$WC = 35.74 + 0.6215 \times T - 35.75 \times V^{0.16} + 0.4275 \times T \times V^{0.16}$$

Where:

WC = Wind Chill Index Expressed as a Temperature in Degrees Fahrenheit (°F)

T = Average Day Temperature in Degrees Fahrenheit (°F)

V = Wind Speed in Miles per Hour (mph)

J. Acceleration Costs: Additional compensation will be made to the CONTRACTOR in the event the OWNER requires the project completion prior to the completion date shown on the CONTRACTOR's accepted schedule. The OWNER, therefore, has the right to accelerate the schedule and the CONTRACTOR will be compensated for such acceleration as long as such acceleration is not required through fault of the CONTRACTOR. Available total float in the CPM Schedule may be used by the OWNER and RESIDENT PROJECT REPRESENTATIVE as well as by the CONTRACTOR after receiving written verification from the OWNER or RESIDENT PROJECT REPRESENTATIVE.

K. Float:

1. Without obligation to extend the overall completion date or any intermediate completion dates set out in the CPM network, the OWNER may initiate changes to the Contract Work that absorb float time only. OWNER-initiated changes that affect the critical path on the CPM network shall be the sole grounds for extending (or shortening) said completion dates. CONTRACTOR initiated changes that encroach on the float time identified in the CPM network may be accomplished with the OWNER's concurrence. Such changes, however, shall give way to OWNER-initiated changes competing for the same float time.
2. CONTRACTOR shall not use Float suppression techniques, including preferential sequencing (arranging critical path through activities more susceptible to OWNER caused delay); lag logic restraints; zero total or free Float constraints; extended activity times as determined by the RESIDENT PROJECT REPRESENTATIVE; or imposing constraint dates other than as required by the Contract. Float suppression will be cause for rejection of the preliminary progress schedule or full progress schedule and its updates.

L. Data Dates:

1. Data date is resettable date in P6 that serves as the end of the reporting period. The reporting period shall be recorded on a monthly basis, e.g. January 1st through January 31st with the 31st as the data date. If required for coordination purposes by OWNER, RESIDENT PROJECT

REPRESENTATIVE will provide specific data dates to be used by CONTRACTOR.

1.9 COORDINATING PROGRESS SCHEDULE WITH OTHER CONTRACT SCHEDULES

- A. Where Work is to be performed under this Contract concurrently with, or contingent upon, work performed by others on the same facilities, or within an area under other Construction Contracts associated with the GWA or other known projects coordinated with the local municipalities, the Progress Schedule shall be coordinated with the schedules of the other contracts. OWNER will provide the schedules of other contracts for preparation and updating of the Progress Schedule for Contracts under the Owner's control. CONTRACTOR shall revise the Progress Schedule as required by changes in schedules of other contracts.

1.10 SCHEDULE SOFTWARE SETTINGS AND RESTRICTIONS

- A. Schedule Options:
1. Shall be defined only to "Use expected finish dates";
 2. Scheduling progressed activities to be set to "Use only retained logic", not progress override option;
 3. Critical Path activities defined as Total Float less than or equal to zero;
 4. Calculating start-to-start lag from "early start" dates; and computing total Float as "finish Float = late finish – early finish";
 5. Calendar to be set for scheduling relationship lag as "Predecessor Activity Calendar."
- B. Activity progress shall be shown using Remaining Duration. Date format shall be DDMMYY.
- C. Default activity type shall be set to "Independent Task".
- D. Date/time activity constraints, other than those required by the Contract, will not be allowed unless accepted by RESIDENT PROJECT REPRESENTATIVE. CONTRACTOR shall identify proposed constraints and explain the constraint purpose in the Narrative Report.
- E. Lags shall not be used in the creation of an activity that will perform the same function, e.g. concrete cure time. Lag durations contained in the Progress Schedule shall not have a negative value. CONTRACTOR shall identify any lag proposed and explain the purpose of the lag in the Narrative Report.

F. Actual Start and Finish dates shall not be automatically updated by default mechanism that may be included in the CPM scheduling software system. Actual Start and Actual Finish dates on the CPM schedule shall be updated by actual work progression.

G. Activity codes: Activity codes and work breakdown structure (WBS) to be confirmed or revised by RESIDNET PROJECT REPRESENTATIVE are listed below. Confirmation or revision will be provided to CONTRACTOR within three (3) workdays of the Effective Date of the Contract. Use of activity codes and WBS is mandatory.

1. "Project Codes" is reserved for OWNER. Only "Activity Codes" at Project level will be permitted for CONTRACTOR's use:

Activity Code	Code Value	Description
Phase	0005	Construction Phase
Construction Phase	A	Milestones
	B	Administrative
	C	Submittals
	D	Construction Activities
	E	Closeout Phase
Submittals	SUB	Submittals
	R&A	Review & Approve
	F&D	Fabricate & Deliver

Other codes to be prescribed by RESIDENT PROJECT REPRESENTATIVE or requested by CONTRACTOR for project specific criteria.

3. GWA Program Required Schedule Activities:

Activity ID	Activity Name	Description	Responsibility
CP5-A-00	Contract Package Start (NTP)	Milestone	OWNER
CP5-A-01	Complete Pipe and Restrained DI Cap at Contract Package Interface with Return Flow Pumping Station	Milestone	Contractor
CP5-A-02	Complete Pipe and Restrained DI Cap at Contract Package Interfaces with Contract	Milestone	Contractor

Package 2B

CP5-A-03	Complete Pipe and Restrained DI Cap at Contract Package Interface with Contract Package 6	Milestone	Contractor
CP5-A-04	Substantial Completion	Milestone	Contractor
CP5-A-05	Final Completion	Milestone	Contractor

H. Activity Relationships: Relationships between activities shall be identified with the following information:

1. Predecessor and successor activity ID.
2. Relationship types:
 - a. FS – Finish to Start
 - b. SS – Start to Start
 - c. FF – Finish to Finish
 - d. SF – Start to Finish – This relationship is not allowed unless authorized by the ENGINEER or RESIDENT PROJECT REPRESENTATIVE

I. Project Calendars: Project Calendars shall use workdays and calendar days as the planning unit for the schedule. Use of Global Calendars is reserved for OWNER. Each calendar shall be set to start on Mondays with holidays in accordance with OWNER policy.

1. The following calendars shall be used for each activity except as the otherwise accepted by RESIDENT PROJECT REPRESENTATIVE:
 - a. 5-Day x 8-Hour workweek (with holidays) shall be used for 5-day 40-hour workweek activities: Monday through Friday. All holidays and non-work days shall be assigned to this calendar. This calendar shall be used for all normal work activities. This calendar shall be the default calendar for the project unless otherwise specified.
 - b. 5-Day x 10-Hour workweek (with holidays) shall be used for 5-day 50-hour workweek activities: Monday through Friday. All holidays and non-work days shall be assigned to this calendar.

- c. 6-Day x 10-Hour workweek (with holidays) shall be used for 6-day 60-hour workweek activities: Monday through Saturday. All holiday and non-work days shall be assigned to this calendar.
 - d. 7-Day Calendar (no holidays) shall be used for 7-day workweek activities. No non-work days shall be entered into this calendar.
 - e. Additional Calendars may be assigned depending on need. CONTRACTOR shall consult with RESIDENT PROJECT REPRESENTATIVE before other calendars are entered and or used in the Progress Schedule.
- 2. The work day to calendar day correlation shall be based on a single shift and 5-day workweek with adequate allowance for holidays, adverse weather, and all other special requirements of the Work. CONTRACTOR may, at his option, propose alternate baseline calendars to allow a second shift and or a single shift on Saturdays subject to the concurrence and acceptance of OWNER. Under no circumstances will a schedule be accepted which allows regularly scheduled work on Sundays.
 - 3. Holidays observed by OWNER are defined under Supplementary Conditions, Article 7.02.B.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used



Waukesha Water Utility
115 Delafield Street
Waukesha, Wisconsin 53187

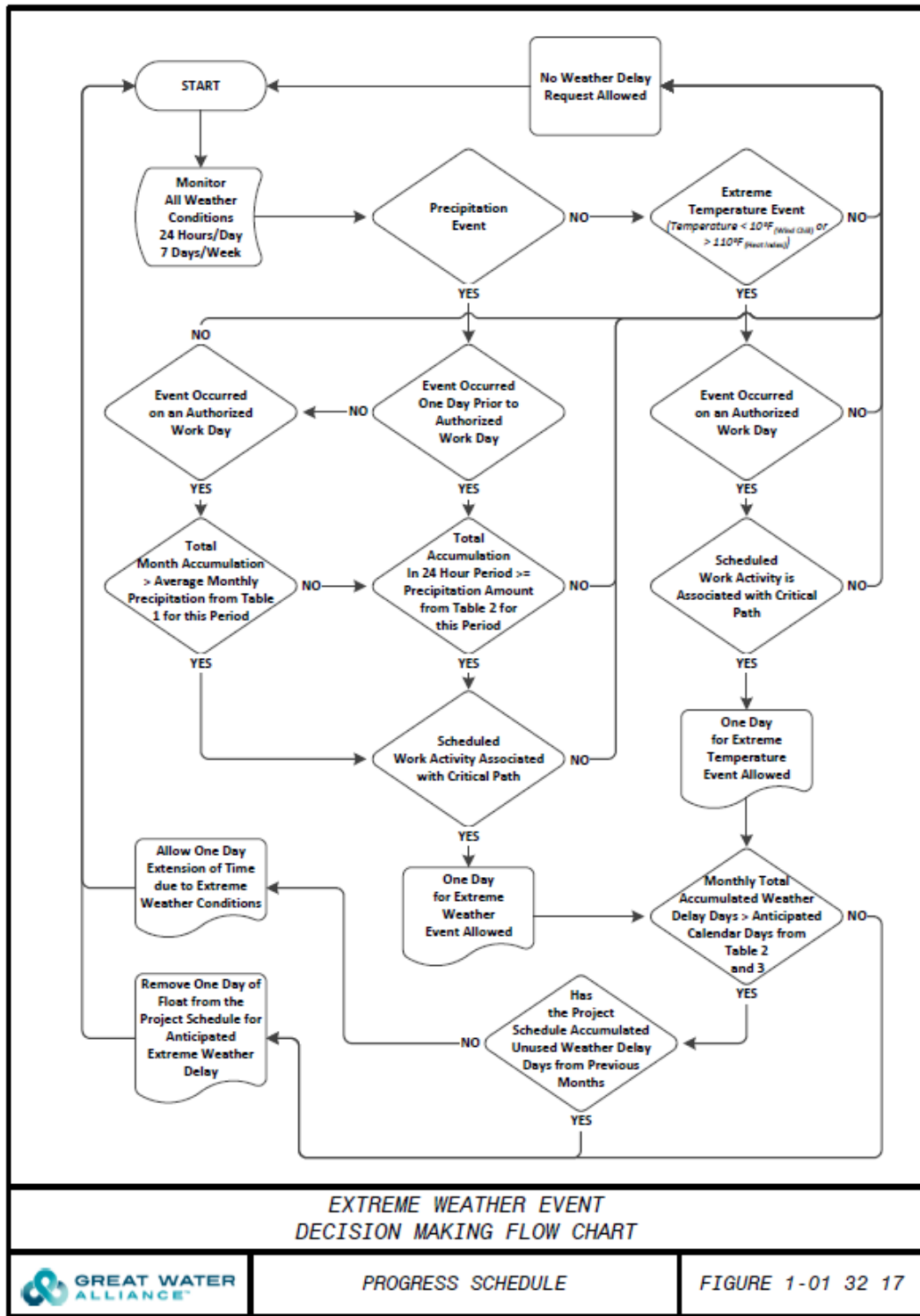
Weather Delay Request					
Owner: _____			Project No.: _____		
Project Title: _____			File No.: _____		
Project Limits: _____			Date: _____		
Location: _____			Prepared By: _____		
Request Number: _____					
General Contractor:			Sub-Contractor(s) On-Site:		
Tel: _____ Fax: _____					
Normal Work Hours:					
Impact Date: _____		Start Time: _____		End Time: _____	
Total: _____		Hrs. _____			
Weather Conditions: (Weather Data, River Data, Wind Chill, Heat Index)					
Weather Condition and Duration:				Type of Impact:	
Period:					
Temperature:	°F	°F	°F	°F	°F
Dew Point:	°F	°F	°F	°F	°F
Humidity:	%	%	%	%	%
Wind Direction:					
Wind Speed:	mph	mph	mph	mph	mph
Wind Gust:	mph	mph	mph	mph	mph
Heat Index/Wind Chill:	°F	°F	°F	°F	°F
Pressure:	in	in	in	in	in
Precipitation:	in	in	in	in	in
Event:					
Conditions:					
River Name:	ft	ft	ft	ft	ft
River Level (Datum _____):					
Stage: Action: _____, Flood: _____					
	Low Temp.	High Temp.	Ave. Wind Speed	Total Prec.	Total Snow
Daily Observation:	°F	°F	mph	in	in
Schedule Impact:					
Schedule Data Date: _____					
Activity ID	Activity Description	Critical Path	Anticipated Delay Day	Time Extension Requested	
		<input type="checkbox"/> Yes / <input type="checkbox"/> No	<input type="checkbox"/> Yes / <input type="checkbox"/> No	<input type="checkbox"/> Yes / <input type="checkbox"/> No	
		<input type="checkbox"/> Yes / <input type="checkbox"/> No	<input type="checkbox"/> Yes / <input type="checkbox"/> No	<input type="checkbox"/> Yes / <input type="checkbox"/> No	
		<input type="checkbox"/> Yes / <input type="checkbox"/> No	<input type="checkbox"/> Yes / <input type="checkbox"/> No	<input type="checkbox"/> Yes / <input type="checkbox"/> No	
Request:					
Comments: _____					
Contractor's Representative: _____					
(Project Manager) _____ Date: _____					
Withdrawn By: _____					
_____ Date: _____					
Reason for Withdrawal: _____					
Acceptance:					
Received: <input type="checkbox"/> Acknowledge <input type="checkbox"/> Deny					
Remarks: _____					
Resident Project Representative: _____					
(Resident Project Representative) _____ Date: _____					
Owner's Representative: _____					
(Project Administrator) _____ Date: _____					

T Request must be submitted not later than 72 hours after the weather impact date.

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Page 1

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END OF SECTION

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SECTION 01 33 00

SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description
- B. Definitions
- C. Submittal Procedures
- D. ENGINEER'S Actions on Submittals
- E. Repetitive Reviews
- F. Example Format for CONTRACTOR's Approval and Certification Stamp
- G. CONTRACTOR's Submittal Transmittal Form

1.2 DESCRIPTION

- A. This Section specifies procedural requirements for submittals made by the CONTRACTOR to the ENGINEER including Shop Drawings, substitutions, product data, samples, test data, operations and maintenance data, and other miscellaneous Work-related submittals. Specific submittals required for individual elements of the Work are specified in the associated, individual Specification Sections. Except as otherwise indicated in other Specification Sections, comply with the requirements specified herein for each type of submittal.

1.3 DEFINITIONS

- A. Shop Drawings: The term "Shop Drawings", as used in the General Conditions includes all "Action Submittals" and "Information Submittals" as defined below.
- B. Action Submittals: The following submittals require approval by the ENGINEER as described in Subsection 3.2 of this Section:
 - 1. Manufacturer's Documents: Technical data, drawings and other similar information specially prepared for this Project by product manufacturers and suppliers, including fabrication and installation drawings, diagrams, actual performance curves, data sheets, schedules, templates, patterns, reports, instructions, design mix formulas, measurements, and similar information not in standard printed form.

2. Product Data: Stock or standard printed information on materials and equipment that has not been specially prepared for this Project, including specifications, installation instructions, catalog cuts, wiring diagrams, and color charts.
 3. Working Drawings: Technical data, drawings and other similar information specially prepared for this Project by the CONTRACTOR or Subcontractors, including fabrication and installation drawings, diagrams, and other similar information.
 4. Samples: Refer to the General Conditions
 5. Mock-Ups: Special types of samples that are too large or otherwise inconvenient for handling in the manner specified for transmittal of sample submittals.
 6. "Or Equal" or Substitution Requests: Refer to the General Conditions.
- C. Information Submittals: The following submittals require acknowledgement by the ENGINEER as described in Subsection 3.2 of this Section:
1. CONTRACTOR's Licensed Professional Submittals: Certificates and other documents required by the Contract Documents to be prepared and submitted by the CONTRACTOR's Licensed Professionals.
 2. Inspection and Test Reports
 3. Mill reports
 4. Guarantees
 5. Warranties
 6. Certifications
 7. Experience records
 8. Maintenance agreements
 9. Operation and maintenance manuals
 10. Survey data and reports: property surveys, building or structure condition surveys, field measurements, quantitative records of actual Work, damage surveys, photographs, and similar data required by Specification sections.
 11. Physical work records

12. Quality testing and certifying reports
 13. Industry standards
 14. Record drawings
- D. Other Submittals: For submittals concerning the following refer to the indicated Contract Document Section:
1. Listing of manufacturers – Section 01 60 00
 2. Suppliers, and subcontractors – Article 7.06 of the General and Supplementary Conditions
 3. Construction progress schedule – Section 01 32 17
 4. Schedule of shop drawing submissions - Article 2.03 of the General and Supplementary Conditions.
 5. Bonds – Article 6 of the General and Supplementary Conditions
 6. Schedule of values – Section 01 29 00
 7. Payment applications – Section 01 29 00
 8. Insurance certificates - Article 6 of the General and Supplementary Conditions
 9. Dust Control Plan – Section 01 50 00.
- E. Clarifications and Interpretations:
1. The CONTRACTOR is responsible to review the Contract Documents, determine the type and extent of the Work and make all necessary field measurements before starting the Work. If any conflict, error, ambiguity, or discrepancy is discovered the CONTRACTOR is to submit a written request for interpretation or clarification from ENGINEER and RESIDENT PROJECT REPRESENTATIVE. The ENGINEER and RESIDENT PROJECT REPRESENTATIVE will issue a written clarification or interpretation of the requirements of the Contract Documents as ENGINEER and RESIDENT PROJECT REPRESENTATIVE may determine necessary, consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on the CONTRACTOR.

2. If the CONTRACTOR submits a written request for information that does not, in the sole discretion of the ENGINEER and RESIDENT PROJECT REPRESENTATIVE, require clarification or interpretation of the Contract Documents, ENGINEER or RESIDENT PROJECT REPRESENTATIVE will notify CONTRACTOR that such information is contained (or could otherwise be reasonably determined) in the Contract Documents. The CONTRACTOR shall reimburse OWNER for ENGINEER's charges for evaluating and responding to such a request for information.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 SUBMITTAL PROCEDURES

A. Scheduling:

1. Submit a preliminary schedule of submittals, in duplicate, and in accordance with Paragraph 2.03 of the General Conditions for acceptance by the ENGINEER and RESIDENT PROJECT REPRESENTATIVE. ENGINEER will review no submittals until an acceptable schedule of submittals has been submitted. If the CONTRACTOR intends to request a substitute(s) for the materials or equipment specified, schedule substitution request(s), along with any related, subsequent submittals, in the schedule of submittals and submit as scheduled.
2. Schedule, prepare and transmit each submittal to ENGINEER sufficiently in advance of scheduled performance of related Work and other applicable activities.

B. Coordination:

1. Coordinate the preparation and processing of submittals with the performance of the Work. Coordinate each submittal with other submittals and related activities, such as substitution requests, testing, purchasing, fabrication, delivery, and similar activities that require sequential performance. Coordinate submissions for different items of interrelated work so that one submittal will not be delayed by ENGINEER's need to review a related submittal.
2. ENGINEER may return any submittal requiring coordination with other submittals without review and marked "Revise and Resubmit". This type of returned submittal will be counted as a submittal subject to the provisions of 3.3 –REPETITIVE REVIEWS of this Section.

3. The ENGINEER will not hold a submittal awaiting additional information from the CONTRACTOR.

C. Electronic Submittals

1. Assemble each submittal in a single, separate, PDF file.
2. Include Submittal Transfer Form as the first page of the file. Identify features of the submittal which may not be in conformance with contract document requirements.
3. For large submittals, include bookmarks within file to navigate through file.
4. Name file with submittal numbering as specified.
5. The ENGINEER will establish an electronic submittal management system upon contract award and maintain the system for the duration of the General Prime Contractor's contract. The electronic Submittals Management System will be continuously accessible via the Internet to all required entities with password controlled accessibility and permissions.
6. Enter and maintain submittals in the electronic Submittals Management System, except those not able to be digitally transmitted, such as samples or documents. Maintain the number and type of hard copies of documents required to be original by governmental regulations, as specified, or as ordered by the ENGINEER at the Project Site, available for use by the ENGINEER and others at all times.

D. Submittal Preparation:

1. All Submittals: Review each submittal to determine, as applicable, that:
 - a. The submittal is required by the Contract Documents. The ENGINEER will only review submittals required by the Contract Documents.
 - b. The materials and equipment depicted in the submittal are intended for incorporation into the Work.
 - c. The submittal is complete and in sufficient detail to allow ready determination of compliance with the Contract Documents.
 - d. The items depicted in the submittal will fit in the space available.
 - e. The information in the submittal has been coordinated with the requirements of the Contract Documents; work to be performed by all

trades involved; field measurements and other requirements of the Work.

- f. The submittal does not contain standard printed information unless full identification of the project-specific portions and any project-specific supplementary information is shown thereon in ink or typewritten form.
- g. The submittal does not encompass more than one Section of the Specifications.
- h. The submittal presents, where applicable, such data as dimensions, weights, and performance characteristics on drawings for mechanical and electrical equipment. Show conformance with the performance characteristics and other criteria included in the Contract Documents. Review of such information will be subject to the provisions of General Conditions paragraph 7.16.D.
- i. Variations from the Contract Documents have been specifically noted on the Submittal Transmittal Form and highlighted on all relative documents within the submittal that are affected by the variation. ENGINEER's responsibility for variations is established in paragraphs 7.16.D.4 and 7.16.D.6 of the General Conditions.
- j. The submittal is in compliance with the Contract Documents and a completed approval and certification stamp has been placed on each submittal document. Use a stamp containing the information shown in the sample stamp at the end of this section. ENGINEER will rely upon CONTRACTOR's certification of compliance that the CONTRACTOR has reviewed and approved the submittal and has confirmed that the submittal conforms to all the requirements of the Contract Documents except for variations specifically noted on the Submittal Transmittal Form and all attached documents. Submittals will be returned to CONTRACTOR without action if certification is not provided and the submittal will be counted as a submittal subject to the provisions of 3.3 –REPETITIVE REVIEWS of this Section.

2. Manufacturer's Documents and Working Drawing submittals:

- a. Accurately and distinctly present the following:
 - (1) Graphical information at accurate scale
 - (2) Name, address and telephone number of manufacturer or supplier
 - (3) Materials and equipment that are to be included in the Work

- (4) Compliance with standards
- (5) All dimensions, clearly identifying those dimensions based on field measurement
- (6) Arrangements and sectional views
- (7) Necessary details, including complete information on making connections between Work in this project, work in other related projects and existing facilities
- (8) Electrical wiring connections between all equipment provided including all internal wiring between internal components of equipment
- (9) Kinds of materials and finishes
- (10) Parts list and descriptions thereof
- (11) Spare parts, lubricants or special tools required by the Contract Documents

b. Include the following on each drawing or page:

- (1) Preparation date and revision dates
- (2) Project name
- (3) Specification Section number and page number
- (4) Identification of equipment or materials
- (5) Name of CONTRACTOR (and Subcontractor if applicable)
- (6) Name of Supplier and/or Manufacturer
- (7) Field dimensions, clearly identified
- (8) Standards or industry specification references
- (9) Identification of variations from the Contract Document requirements
- (10) Physical location and location relative to other facilities that the Work-related equipment or materials are to be installed adjacent to or connected with

(11) Provide 8-inch wide by 3-inch high blank space for CONTRACTOR's and ENGINEER's stamps

3. Product Data:

- a. Assemble all data into a single submittal for each element of work or system. Where product data includes information on several similar products, some of which are not required for use on the subject Project, clearly mark to show such information is not applicable.
- b. Where data must be specially prepared for required materials or equipment because standard printed data are not suitable for use, submit the data as a Manufacturer's Document and not as Product Data.
- c. Submit product data with appropriate Manufacturer's Document or Working Drawing, when applicable.

4. Samples:

- a. Whenever possible, provide samples physically identical with the materials proposed for incorporation into the Work. Where variations in color, pattern or texture and the like are inherent in materials represented by samples, submit multiple samples (not less than 3) showing the approximate range of variations.
- b. Submit samples for visual review of generic kind, color, pattern, texture, and for a final check of coordination of these characteristics with other related elements of the Work and existing facilities.
- c. Include information with each sample to provide a generic description of the item, and its name, manufacturer, limitations, and compliance with standards.
- d. Submit 3 sets of samples, where specifications indicate selection of color, pattern, texture or similar characteristics from manufacturer's range of standard choices is necessary.

5. Mock-Ups:

- a. Mock-ups and similar samples are recognized as special types of samples. Comply with samples submittal requirements to the greatest extent possible. Process Submittal Transmittal Forms to provide a record of activity.

6. Requests for "Or Equal" or Substitution:
 - a. Follow the General Conditions, except for the following: CONTRACTOR shall reimburse OWNER for ENGINEER's charges for evaluating a proposed "Or Equal" that receives a negative determination.
7. CONTRACTOR's Licensed Professional Submittals:
 - a. Submit certificates and other documents required by the Contract Documents to be prepared and submitted by the CONTRACTOR's Licensed Professionals.
8. Inspection and Test Reports:
 - a. Identify each inspection and test report as either specially prepared for the Project or a standard publication of workmanship control testing at point of production. Submit in accordance with the requirements for Manufacturer's Documents or Product Data, respectively as described in this Section.
9. Mill Test Reports, Experience Records, Physical Work Records, Guarantees, Warranties, and Maintenance Agreements:
 - a. Refer to the Contract Documents sections for specific requirements.
10. Survey Data:
 - a. Refer to the various Contract Documents for specific requirements.
11. Certifications, Quality Testing and Certifying Reports:
 - a. Refer to Specification sections for specific requirements on submittal of certifications. Certifications are submitted for review of conformance with specified requirements and information. Submittal is final when reviewed and returned by ENGINEER with no further action required.
12. Closeout Submittals:
 - a. Refer to Specification sections and Section 01 78 00 for specific requirements on submittal of closeout information, materials, tools, and similar items such as:
 - (1) Warranties and Bonds

(2) Record Drawings

(3) Special Tools

13. Operation and Maintenance Manuals:

- a. Submit Operation and Maintenance Manuals in accordance with Section 01 78 23

E. Submittal Transmittal Form: Use the Submittal Transmittal Form found at the end of this Section to forward each specific submittal package to the ENGINEER. Provide all the information indicated on the Form and answer each question. Submittals with incomplete information on the Submittal Transmittal Form will be returned to the CONTRACTOR marked "Revise and Resubmit" and will be counted as a submittal subject to the provisions of 3.3 –REPETITIVE REVIEWS of this Section.

F. Submittal Numbering:

1. Number all submittal items as follows:

AA-BBBBBB-CCC-REE

Where AA = Submittal type

(D – Submittal data

S – Sample

P – O&M Preliminary

M – O&M Final

T – Training

R – Repair/Spare Parts

W – Warranty)

BBBBBB = Specification Section

CCC = Section Item No.

REE = Revision No.

Example: D-400520-001-R00 indicated the first submission of the first product requirement of Specification Section 40 05 20.

D-400520-003-R01 indicated the second submission of the third product requirement of Specification Section 40 05 20.

2. When a document(s) is resubmitted for any reason, use a new Submittal Transmittal Form with the same submittal number and a new, sequential alphabetic suffix.

G. Resubmittal Preparation:

1. Comply with the requirements described in the Submittal Preparation subsection above. In addition:
 - a. Identify on the Submittal Transmittal Form that submittal is a resubmission.
 - b. Make and clearly identify any corrections or changes required by ENGINEER's notations on the previous, returned submittal.
 - c. Respond to ENGINEER's notations:
 - (1) On the Submittal Transmittal Form or on a separate page(s) attached to the Submittal Transmittal Form, answer or acknowledge, in writing, all notations or questions indicated by ENGINEER on the ENGINEER's response to the previous submittal.
 - (2) Identify each response by the corresponding question or notation number established by ENGINEER.
 - (3) If CONTRACTOR does not respond to each notation or question, the ENGINEER will return the resubmission without action. Additional resubmittals will be required until the CONTRACTOR provides a written response to all of the ENGINEER's notations or questions.
 - d. Indicate CONTRACTOR initiated revisions or variations:
 - (1) On the Submittal Transmittal Form identify variations or revisions from the previously reviewed submittal, other than those called for by ENGINEER.
 - (2) ENGINEER's responsibility for variations or revisions is established in Paragraphs 7.16.A.3, 7.16.D.4 and 7.16.D.6 of the General Conditions.

H. Distribution

1. Manufacturer's Documents, Working Drawings, Product Data and Samples and Mock-ups:
 - a. After a submittal is stamped "Approved" (See Subsection 3.2), in a new PDF file, place the date of approval on the submittal and transmit to the ENGINEER together with the Submittal Transmittal Form

indicating the submittal is a “Distribution of Approved Submittal”. For Mockups, distribute a Submittal Transmittal Form only.

After a submittal is stamped “Approved as Noted” (See Subsection 3.2), in a new PDF file, make the changes noted by ENGINEER and place the date of approval on the submittal and transmit to the ENGINEER together with the Submittal Transmittal Form indicating the submittal is a “Distribution of Approved as Noted Submittal”.

- b. If changes other than those marked by the ENGINEER are made, follow the requirements of Paragraph 3.1, F to obtain ENGINEER approval.
- c. Unless required elsewhere, provide distribution of “Approved” and “Approved as Noted” submittals to subcontractors, suppliers, governing authorities, and others as necessary for proper performance of the Work.
- d. Maintain one set of “Approved” and revised “Approved as Noted” submittals in PDF form on the electronic Submittals Management System accessible at the Project site, available for use by the ENGINEER and RESIDENT PROJECT REPRESENTATIVE at all times.
- e. Maintain returned final set of samples at the Project site, in suitable condition and available for quality control comparisons throughout the course of performing the Work. Incorporate only undamaged samples into the Work, when permitted by the Contract Documents.
- f. Prior to project closeout, submit a complete set of project submittals in PDF format on CD, DVD, USB flash drive, or downloadable link via the electronic Submittals Management System to the ENGINEER.

I. CONTRACTOR’s Licensed Professional Submittals

- a. After a submittal is acknowledged by the ENGINEER (See Subsection 3.2,2), in a new PDF file, place the date of acknowledgement on the submittal and transmit to the ENGINEER together with the Submittal Transmittal Form indicating the submittal is a “Distribution of Acknowledged Submittal”.
- b. Maintain one set of submittals in PDF form on the electronic Submittals Management System accessible at the Project site, available for use by the ENGINEER and RESIDENT PROJECT REPRESENTATIVE and at all times.

3.2 ENGINEER'S ACTIONS ON SUBMITTALS

A. General:

1. Review and approval by the ENGINEER of Action Submittals will be subject to the provisions of General Conditions. ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the requirements of the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole. ENGINEER's review or approval of any submittal does not authorize a change to the Contract Time or Price.
2. ENGINEER's review and approval of Action Submittals will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) nor to safety precautions or programs incident thereto. The review and approval of a separate item will not indicate approval of the assembly in which the item is a part.
3. ENGINEER will stamp each Action Submittal except Requests for Interpretation or Clarification with an appropriate action stamp.

B. ENGINEER's Action

1. Stamps:

a. Approved:

- (1) Where submittals are stamped "Approved", Work covered by submittal may proceed PROVIDED THE WORK COMPLIES WITH THE CONTRACT DOCUMENTS. Acceptance of Work will depend upon that compliance.

b. Approved As Noted:

- (1) When submittals are stamped "Approved as Noted", Work covered by submittal may proceed PROVIDED IT COMPLIES WITH ENGINEER'S NOTATIONS AND CORRECTIONS ON SUBMITTAL AND WITH THE CONTRACT DOCUMENTS. Acceptance of Work will depend on that compliance.

c. Revise and Resubmit:

- (1) When submittals are stamped "Revise and Resubmit" do not proceed with Work covered by submittal. Do not permit Work

covered by submittal to be used at Project site or elsewhere where Work is in progress.

- (2) Revise submittal in accordance with ENGINEER's notations and corrections and resubmit in accordance with Subsection 3.1F of this Section.

2. Acknowledgements of Information Submittals

- a. When Information Submittals conform to the format requirements in the Contract Documents ENGINEER will acknowledge such submittals via a response transmittal.
- b. If an Information Submittal does not conform to the format requirements of the Contract Documents, ENGINEER will return the submittal with comments or questions. Do not proceed with Work covered by the submittal and do not permit Work covered by the submittal to be used at Project site or elsewhere where Work is in progress. Resubmit the Information Submittal until the ENGINEER acknowledges that the submittal conforms to the format required.

3.3 REPETITIVE REVIEWS

- A. Cost of Repetitive Reviews: Submittals will be reviewed no more than twice at the OWNER's expense. All subsequent reviews will be performed at times convenient to the ENGINEER and at the CONTRACTOR's expense based on the ENGINEER's then prevailing rates including all direct and indirect costs and fees. Reimburse the OWNER for all such costs and fees invoiced to the OWNER by the ENGINEER for third and subsequent submittals.
- B. Time Extension: Any need for more than one resubmission, or any other delay in ENGINEER's review of submittals, will not entitle CONTRACTOR to an extension of the Contract Time.

3.4 EXAMPLE FORMAT FOR CONTRACTOR'S APPROVAL AND CERTIFICATION STAMP

- A. An example format for the CONTRACTOR's approval and certification stamp is as follows:

<p style="text-align: center;"><i>CONTRACTOR'S NAME</i></p> <p>_____ Approved and Certified to comply with the Contract Documents.</p> <p>_____ Approved and Certified to comply with the Contract Documents, except for variations specifically noted on the Submittal Transmittal Form and the associated documents.</p> <p>PRINTED NAME: _____</p> <p>TITLE: _____</p> <p>SIGNATURE: _____</p> <p>DATE: _____</p>
--

- 3.5 EXAMPLE FORMAT FOR CONTRACTOR’S LICENSED PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF WISCONSIN
- A. An example format for the CONTRACTOR’s Licensed Professional Engineer certification signature and seal is as follows:

CONTRACTOR'S NAME

LICENSED PROFESSIONAL ENGINEER'S COMPANY NAME

The following system has been prepared and designed by:

a Licensed Professional Engineer registered in the State of Wisconsin and experienced in

PRINTED NAME: _____

TITLE: _____

LICENSE NUMBER: _____

DATE: _____

SIGNATURE AND SEAL:

Expiration Date:

3.6 CONTRACTOR'S SUBMITTAL TRANSMITTAL FORM

A. The format for the CONTRACTOR's Submittal Transmittal Form is as follows:

CONTRACTOR'S NAME
SUBMITTAL TRANSMITTAL FORM
Contract Package 5

TO: _____	DATE: _____
ATTN: _____	SITE: _____
	SPEC. REF. NO. _____
	DRAWING REF. NO. _____
FROM: _____	SUBMITTAL NO. _____

1. The following documents are forwarded for your review:

Submittal Number		Document Originator	Date	Description
Specification Section	Submittal No. (Version)			
### ##	- ###(A)			

2. Will item submitted for review fit in space provided in the Contract Documents? _____ Yes _____ No _____ Not Applicable
3. Has work indicated in this submittal been coordinated with all trades? _____ Yes _____ No _____ Not Applicable
4. Has the Contractor approved submittal and affixed completed approval and certification stamp? _____ Yes _____ No
5. Contractor's description and justification for variations from the Contract Documents. (Use additional pages, if necessary)

6. Remarks: _____
-
-
-

Printed Name: _____

Signature: _____

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 41 00

REGULATORY AND SPECIAL REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Summary
- B. Permits
- C. Notifications
- D. Regulations and Special Requirements

1.2 SUMMARY

- A. Section Includes: Requirements for permitting and other special requirements, including wetland and waterway restoration, impacted soil and groundwater management, agricultural mitigation, endangered resources compliance, archaeological resources protection, and special crossing or conflicts.
- B. Take responsibility for identifying and obtaining necessary permits for construction. Include the fees associated with all necessary permits as part of Contract Item 1.

1.3 PERMITS

- A. General: Submit copies of required permits to the RESIDENT PROJECT REPRESENTATIVE before performing any work.
- B. OWNER or ENGINEER has obtained the following permits:
 - 1. Wastewater Facilities Plan Amendments
 - 2. Public Service Commission – Type 2 Certificate of Authority (Water Systems Construction Plan Review)
 - 3. Wisconsin Department of Natural Resources (WDNR) – Wetland and Waterway Impact Individual Permits
 - 4. WDNR – Final Environmental Impact Statement (EIS)
 - 5. WDNR – Clean Water Plant (CWP) Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Renewal with a Root River Discharge

- C. OWNER or ENGINEER will obtain the following permits. Once obtained, the document will be furnished to the CONTRACTOR.
 - 1. WisDOT Permit to Construct, Operate, and Maintain Utility Facilities on Highway Right-Of-Way work. The permit is anticipated to be approved no later than August 2020. Do not commence construction in WisDOT Right-Of-Way until permit approval is obtained.
 - 2. United States Army Corps of Engineers (USACE) – Section 404 Wetland and Waterway Individual Permit. The permit is anticipated to be approved no later than August 2020. Do not commence construction in areas with wetlands until permit approval is obtained.
- D. Obtain other Federal, State, and local permits required for construction of the work. Permits for construction in state and county right-of-way to be coordinated and shared with local community as well.
- E. Coordinate with the RESIDENT PROJECT REPRESENTATIVE for permits that require OWNER signature. Allow up to three (3) working days for OWNER signature. OWNER's signature does not constitute a review and approval of the permit.

1.4 NOTIFICATIONS

- A. The RESIDENT PROJECT REPRESENTATIVE has authority to notify the CONTRACTOR in writing of any non-compliance with the requirements listed in this Section or of any environmentally objectionable acts and corrective action to be taken. Federal, State or local agencies responsible for verification of certain aspects of the environmental protection requirements are to notify the CONTRACTOR in writing of any non-compliance with Federal, State or local requirements. Immediately take corrective action after receipt of such notice from the RESIDENT PROJECT REPRESENTATIVE or from the regulatory agency. OWNER or regulatory agency may issue an order stopping all or part of the work until satisfactory corrective action has been taken if CONTRACTOR fails or refuses to comply. No part of the time lost due to an order stopping work can be made the subject of a claim for extension of time or for excess costs or damages by the CONTRACTOR unless it is later determined that the CONTRACTOR was in compliance.

1.5 REGULATIONS AND SPECIAL REQUIREMENTS

- A. Comply with local, State, and Federal laws, rules, ordinances, and regulations including, but not limited to, the following:
 - 1. United States Army Corps of Engineers (USACE)

2. Wisconsin Department of Natural Resources (WDNR)
3. Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP)
4. State Historic Preservation Officer - Wisconsin Historical Society (SHPO)
5. Wisconsin Department of Transportation (WisDOT)
6. Waukesha County
7. City of Franklin
8. City of New Berlin
9. City of Waukesha
10. Town of Waukesha
11. TransCanada / ANR Pipeline Company
12. Canadian National Railway Company
13. West Shore Pipe Line Company
14. We Energies

B. Wetland and Waterway Permit Requirements

1. General: The Wetland and Waterway Permits have been approved by USACE and WDNR. Refer to the Appendix Book for approved Section 404 Permits and Chapter 30 Permits.
 - a. Contractor to follow conditions in the permit unless noted otherwise.
 - b. Conditions in the permit to bring the Contractors attention to include, but are not limited to:
 - (1) General Condition 1: You must notify Geri Radermacher at phone (262) 574-2153 or email Geri.Radermacher@wisconsin.gov before starting the project construction and again not more than 5 days after the discharge is complete.
 - (2) General Condition 2: Within one week of completion, you must submit a series of photographs to the department showing all work authorized by this permit. The photographs must be clear,

labeled with the wetland/waterway feature identifier, and must show each permitted activity and appropriate restoration.

- (3) General Condition 8: A copy of this permit must be posted on the project web site for at least five days prior to construction and remain posted until at least five days after construction and restoration work have ended. A copy of this permit and approved construction plan must be available at all project field offices and construction sites until the project is complete. All employees, consultants, and contractors who are working on the project must be made aware of the permit, its conditions, and its location. All appropriate managers and supervisors in charge of, or working on construction or compliance, be provided with copies of the permit.
 - (a) The ENGINEER will be responsible for posting a copy of the permit to the project web site.
- (4) General Condition 12: Spills of hazardous or toxic materials that pose a threat to human health, safety or the environment must be cleaned up to the extent practicable. All spills should be reported immediately to the department using the 24-hour toll free hot line, 1-800-943-0003. For more information, please visit the spills program web page: www.dnr.state.wi.us/org/aw/rr/spills/index.htm.
- (5) General Condition 13: You shall update the Endangered Resources Review(s) for this project within one year of the start of construction and comply with all required actions within the review letter.
 - (a) The ENGINEER will be responsible for updating the Endangered Resources Review(s) for the project within one year of the start of construction.
- (6) General Condition 14: All equipment used for the project including but not limited to vehicles, construction machinery, barges, boats, hoses, sheet pile and pumps shall be decontaminated for invasive and exotic viruses and species prior to use and after use.

The following steps must be taken every time you move your equipment to avoid transporting invasive and exotic viruses and species. To the extent practicable, equipment and gear used on infested waters shall not be used on other non-infested waters.

- (a) Inspect and remove aquatic plants, animals, and mud from your equipment.
- (b) Drain all water from your equipment that comes in contact with infested waters, including but not limited to tracked vehicles, barges, boats, hoses, sheet pile and pumps.
- (c) Dispose of aquatic plants, animals in the trash. Never release or transfer aquatic plants, animals or water from one waterbody to another.
- (d) Wash your equipment with hot (>140° F) and/or high-pressure water, - OR -

Allow your equipment to dry thoroughly for 5 days.

- (7) Wetland Condition 31: All vehicles and equipment used in wetlands shall be checked at least once per work day for fluid (e.g. fuel, oil, hydraulic, coolant, etc.) leaks. All leaks must be immediately corrected before the equipment is allowed back into operation.
- (8) Wetland Condition 32: All wetlands shall be restored to pre-existing conditions including the soil profile, elevations, vegetative cover and hydrology. You shall submit a final wetland restoration plan to the department. This plan shall be approved in writing prior to conducting any work in wetland.
- (9) Waterway Condition 37: Prior to conducting any stream dredging, you shall provide the department a stream crossing plan. The plan shall include site specific waterway details (width, bank slope and height, stream bed composition, flow data, etc) and crossing details (trench width and length, construction sequence and timing, restoration, stream bypass plan, erosion control plan, emergency action plan, etc). This plan shall be approved in writing by the department prior to conducting stream dredging.
- (10) Waterway Condition 38: Prior to installing the outfall structure, you shall provide the department an outfall structure construction plan. This plan shall include details on the construction sequence, timing, erosion and sediment control, work zone isolation, emergency action plan, etc. This plan shall be approved by the department in writing prior to initiating activities below the OHWM of the Root River.

- (11) Waterway Condition 40: Work in waterways is prohibited between March 1st and June 15th of the calendar year unless approved by the department in writing.
 - (12) Waterway Condition 41: You shall restore all disturbed waterways to pre-existing conditions. You shall provide the department a final waterway restoration plan for review and written approval prior to conducting any dredging and/or installing the outfall structure.
 - (13) Waterway Condition 43: For all dredged waterways, you shall provide the department with documentation post construction to document streambed and streambank elevations and slopes have not changed due to the construction of this project.
2. Comply with the permit requirements, including additional submittals to WDNR, in the Wetland and Waterway Restoration Plan located in the Appendix Book.
3. Comply with all requirements in the Endangered Resources Compliance Plan located in the Appendix Book.

C. Cultural Resources

1. Comply with all requirements in the Unanticipated Archaeological Discoveries Plan located in the Appendix Book.
 - a. When archaeological resources not previously identified through literature and archives research or Phase I archaeological survey are discovered during ground disturbing activities during the course of work, notify the RESIDENT PROJECT REPRESENTATIVE and ENGINEER, who will notify the Lead Environmental Inspector of the discovery as well as Programmatic Support Services.
 - b. When an unmarked human burial, skeletal remains, or burial goods are encountered during construction activities, comply with the respective state laws regarding the treatment of human remains. Human remains may include any human body parts, including hair, teeth, and nails. Ground disturbing activity must cease immediately. Notify the RESIDENT PROJECT REPRESENTATIVE and ENGINEER, who will notify the Lead Environmental Inspector of the discovery immediately, as well as, Programmatic Support Services.

D. Impacted Soil and Groundwater Management

1. General: Comply with the requirements of Section 02 50 00 – Impacted Soil and Groundwater Management and available Technical Data.

E. City of Waukesha Utility Televising

1. Televising existing storm and sanitary sewers and laterals after underground construction activities have been completed but prior to installation of final pavement.
2. The televising is to be completed per the requirements of the City of Waukesha Standard Construction specifications, section 5.3.10. Documentation and reports to be submitted to the ENGINEER for review.

F. Special Crossings or Conflicts

1. Canadian National Railway
 - a. Submittals: Obtain the required Canadian National Railway permits before performing any work within Canadian National Railway jurisdiction.
2. TransCanada / ANR Pipeline Company
 - a. Submittals: Obtain the TransCanada / ANR Pipeline Company Permit before performing any work within TransCanada / ANR Pipeline Company jurisdiction.
 - b. Contact information for TransCanada / ANR Pipeline Company representative is: Daniel Flaherty, (262) 626-3444, dan_flaherty@transcanada.com.
3. We Energies
 - a. Submittals: Obtain construction approval from We Energies. We Energies supplied Utility Worksheets are located in the Appendix Book. Review and comply with Utility Worksheets before performing any work within We Energies jurisdiction.
 - b. Contact information for We Energies representatives is provided in the Appendix Book.
 - c. Special Requirements for supporting We Energies facilities:
 - (1) Gas:
 - (a) If greater than 40 feet of We Energies gas facilities are exposed in parallel to the trench, please contact the Local Operations Supervisor. If these are known ahead of time, please provide advanced notice.

- (b) If there are any nicks to the pipe, integrity of the wrap is compromised, or damage to test stands or valve boxes, please contact Gas Dispatch at 1-800-261-5325 and notify the Local Operations Supervisor.

(2) Electric:

- (a) For pole holds or other electric facility support, please provide a 1 week notice to the Local Operations Supervisor.
- (b) If there are any nicks/cuts to cables or damage to other Electric facilities, please call 1-800-662-4797 and notify the Local Operations Supervisor.

d. Abandoned Mains/Asbestos

- (1) Unless the abandon mains are in the CONTRACTOR's way or to aid them in their installation methods, We Energies' gas mains can be left in place. If they need to be removed, they should be cut and removed in segments to prevent damage to other utilities upon their removal.
- (2) If removal is necessary, abandoned gas mains should be verified by calling Gas Dispatch at 1-800-261-5325.
- (3) If the gas main being removed contains asbestos or is unknown, please call the Local Operations Supervisor, as this may require testing. CONTRACTOR to coordinate with We Energies' contractor for asbestos abatement. The cost for removal, abatement, and disposal is incidental to the project.

Balistreri

(414)-483-5144

<https://www.balestrierigroup.com/services/abatement/>

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 42 00

REFERENCES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Reference Abbreviations
- B. Abbreviations
- C. Reference Standards
- D. Definitions

1.2 RELATED SECTIONS

- A. Information provided in this section is used where applicable in individual Specification Sections, Divisions 1 through 49.

1.3 REFERENCE ABBREVIATIONS

- A. Reference to a technical society, trade association or standards setting organization, may be made in the Specifications by abbreviations in accordance with the following list:

AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ADC	Air Diffusion Council
AFBMA	Anti-friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	Association of Home Appliance Manufacturers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association, Inc.
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	American Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers

ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders' Hardware Manufacturers Association
BIA	Brick Institute of American
CABO	Council of American Building Officials
CAGI	Compressed Air and Gas Institute
CISPI	Cast Iron Soil Pipe Institute
CMAA	Crane Manufacturers Association of America
CRD	U.S. Corps of Engineers Specifications
CRSI	Concrete Reinforcing Steel Institute
CTI	Cooling Tower Institute
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
DOH	Department of Health
DOT	Department of Transportation
FCC	Federal Communications Commission
Fed. Spec.	Federal Specifications
FGMA	Flat Glass Marketing Association
FHWA	Federal Highway Administration
FM	Factory Mutual
HMI	Hoist Manufacturing Institute
HPMA	See HPVA
HPVA	Hardwood Plywood Veneer Association
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IFI	Industrial Fasteners Institute
ISO	International Standards Organization
MIL	Military Specifications
MSS	Manufacturer's Standardization Society
NAAMM	National Association of Architectural Metal Manufacturers
NACM	National Association of Chain Manufacturers
NBS	National Bureau of Standards, See NIST
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NETA	National Electrical Testing Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NFPA	National Fluid Power Association
NIST	National Institute of Standards and Technology
NLMA	National Lumber Manufacturers Association
NSF	National Sanitation Foundation

OSHA	Occupational Safety and Health Act
PCI	Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
SAE	Society of Automotive Engineers
SCPRF	Structural Clay Products Research Foundation
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPI	Society of the Plastics Industry
SSPC	Steel Structures Painting Council
STI	Steel Tank Institute
TCA	Tile Council of American
TIMA	Thermal Insulation Manufacturers' Association
UL	Underwriters' Laboratories, Inc.
USBR	U. S. Bureau of Reclamation
USBS	U. S. Bureau of Standards, See NIST
WDNR	Wisconsin Department of Natural Resources
WIFIA	Water Infrastructure Finance and Innovation Act
WisDOT	Wisconsin Department of Transportation

1.4 ABBREVIATIONS

- A. Abbreviations which may be used in individual Specification Sections Divisions 1 through 49 are as follows:

alternating current..... ac
 American wire gauge..... AWG
 ampere(s) amp
 ampere-hour(s)..... AH
 annual..... ann
 Ampere Interrupting
 Capacity AIC
 atmosphere(s)..... atm
 average..... avg

 Board Foot FBM
 brake horsepower..... bhp
 Brinell Hardness BH
 British thermal unit(s)..... Btu

 calorie (s) cal
 Celsius (centigrade) C
 Center to Center C to C
 centimeter(s) cm
 coefficient, valve flow C_v
 condensate return CR
 cubic..... cu
 cubic centimeter(s)..... cc
 cubic feet per day..... cfd
 cubic feet per hour cfh
 cubic feet per minute cfm
 cubic feet per minute,
 standard conditions scfm
 cubic feet per second cfs
 cubic foot (feet)..... cu ft
 cubic inch(es)..... cu in
 cubic yard(s) cu yd

 decibels dB
 decibels (A scale)..... dBA
 degree(s) deg
 dewpoint temperature dpt
 diameter dia
 direct current..... dc
 dissolved oxygen DO
 dissolved solids..... DS
 dry-bulb temperature dbt

 each..... EA
 efficiency eff
 elevation..... el
 entering water temperature ewt

entering air temperature..... eat
 equivalent direct radiation edr

 face area..... fa
 face to face..... f to f
 Fahrenheit..... F
 feet per day fpd
 feet per hour..... fph
 feet per minute..... fpm
 feet per second..... fps
 foot (feet) ft
 foot-candle fc
 foot-pound ft-lb
 foot-pounds per minute..... ft-lb/min
 foot-pounds per second..... ft-lb/sec
 formazin turbidity unit(s) FTU
 frequency freq
 fuel oil..... FO
 fuel oil supply FOS
 fuel oil return FOR

 gallon(s)..... gal
 gallons per day..... gpd
 gallons per day per
 cubic foot..... gpd/cu ft
 gallons per day per
 square foot gpd/sq ft
 gallons per hour..... gph
 gallons per minute gpm
 gallons per second gps
 gas chromatography and
 mass spectrometry GC-MS
 gauge ga
 grain(s)..... gr
 gram(s)..... g
 grams per cubic centimeter..... gm/cc

 Heat Transfer Coefficient U
 height hgt
 Hertz Hz
 horsepower hp
 horsepower-hour..... hp-hr
 hour(s) hr
 humidity, relative..... rh
 hydrogen ion concentration pH

 inch(es) in

inches per second..... ips
 inside diameter..... ID

 Jackson turbidity unit(s) JTU

 kelvin K
 kiloamperes..... kA
 kilogram(s)..... kg
 kilometer(s)..... km
 kilovar (kilovolt-amperes
 reactive) kvar
 kilovolt(s)..... kV
 kilovolt-ampere(s)..... kVA
 kilowatt(s) kW
 kilowatt-hour(s) kWh

 linear foot (feet) lin ft
 liter(s)..... L
 lump sum..... LS

 megavolt-ampere(s) MVA
 meter(s) m
 micrograms per liter..... ug/L
 miles per hour mph
 milliamperes..... mA
 milligram(s) mg
 milligrams per liter mg/L
 milliliter(s) mL
 millimeter(s) mm
 million gallons MG
 million gallons per day mgd
 millisecond(s) ms
 millivolt(s) mV
 minute(s) min

 nephelometric turbidity
 unit NTU
 net positive suction head..... NPSH
 noise criteria..... nc
 noise reduction coefficient..... NRC
 number no

 ounce(s)..... oz
 outside air..... oa
 outside diameter..... OD

 parts per billion ppb

parts per million..... ppm
 percent pct
 phase (electrical)..... ph
 pound(s)..... lb
 pounds per cubic foot pcf
 pounds per cubic foot
 per hour..... pcf/hr
 pounds per day..... lbs/day
 pounds per day per
 cubic foot lbs/day/cu ft
 pounds per day per
 square foot lbs/day/sq ft
 pounds per square foot..... psf
 pounds per square foot
 per hour..... psf/hr
 pounds per square inch psi
 pounds per square inch
 absolute..... psia
 pounds per square inch
 gauge psig
 power factor..... PF
 pressure drop or
 difference dp
 pressure, dynamic
 (velocity)..... vp
 pressure, vapor..... vap pr

 quart(s)..... qt

 Rankine..... R
 relative humidity..... rh
 resistance res
 return air ra
 revolution(s) rev
 revolutions per minute..... rpm
 revolutions per second..... rps
 root mean squared..... rms

 safety factor sf
 second(s)..... sec
 shading coefficient..... SC
 sludge density index SDI

 Sound Transmission
 Coefficient STC
 specific gravity sp gr
 specific volume..... Sp Vol

sp ht at constant pressure Cp
 square sq
 square centimeter(s).....sq cm
 square foot (feet).....sq ft
 square inch (es) sq in
 square meter(s)..... sq m
 square yard(s)..... sq yd
 standard..... std
 static pressure.....st pr
 supply air sa
 suspended solids SS

yard(s)..... yd
 year(s) yr

temperature temp
 temperature difference TD
 temperature entering TE
 temperature leaving TL
 thousand Btu per hour..... Mbh
 thousand circular mils kcmil
 thousand cubic feet Mcf
 threshold limit value TLV
 tons of refrigeration tons
 torque TRQ
 total dissolved solids..... TDS
 total dynamic head..... TDH

total oxygen demand..... TOD
 total pressure..... TP
 total solids..... TS
 total suspended solids TSS

vacuum..... vac
 viscosity visc
 volatile organic chemical..... VOC
 volatile solids VS
 volatile suspended solids VSS
 volt(s)..... V
 volts-ampere(s) VA
 volume vol

watt(s) W
 watthour(s)..... Wh
 watt-hour demand WHD
 watt-hour demand meter WHDM
 week(s)..... wk
 weight wt
 wet-bulb WB
 wet bulb temperature WBT

- B. Use ASME Y1.1-1989, "Abbreviations for use on Drawings and in Text" for abbreviations for units of measure not included herein in Paragraph 1.4.

1.5 REFERENCE STANDARDS

- A. Latest Edition: Construe references to furnishing materials or testing, which conform to the standards of a particular technical society, organization, or body, to mean the latest standard, code, or specification of that body, adopted and published as of the date of bidding this Contract. Standards referred to herein are made a part of these Specifications to the extent which is indicated or intended.
- B. Precedence: The duties and responsibilities of the OWNER, CONTRACTOR, ENGINEER, RESIDENT PROJECT REPRESENTATIVE or any of their consultants, agents or employees are set forth in the Contract Documents, and are not changed or altered by any provision of any referenced standard specifications, manuals or code, whether such standard manual or code is or is not specifically incorporated by reference in the Contract Documents. Any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority, to undertake responsibility contrary to the powers of the ENGINEER and RESIDENT PROJECT REPRESENTATIVE as set forth in the Contract Documents cannot be assigned to the ENGINEER, RESIDENT PROJECT REPRESENTATIVE, or any of their consultants, agents or employees.

1.6 DEFINITIONS

- A. In these Contract Documents, the words furnish, install and provide are defined as follows:
 - 1. Furnish (materials): to supply and deliver to the project ready for installation and in operable condition.
 - 2. Install (services or labor): to place in final position, complete, anchored, connected in operable condition.
 - 3. Provide: to furnish and install complete. Includes the supply of specified services. When neither furnish, install or provide is stated, provide is implied.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 44 00

PRECONSTRUCTION VIDEOS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing preconstruction videos.

1.2 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Prior to commencing the Work, a color audio-video recording of the entire construction area of the project to serve as a record of the site conditions.
 - 1. Do not begin any construction prior to review and approval of the preconstruction video of the construction area by the ENGINEER and RESIDENT PROJECT REPRESENTATIVE.
 - 2. Retain one copy of the approved preconstruction videos and written records and submit to the ENGINEER and RESIDENT PROJECT REPRESENTATIVE at project close out.

PART 2 PRODUCTS

2.1 VIDEO MEDIA

- A. Produce the video portion of the recording with bright, sharp, and clear pictures with accurate colors free from distortion, tearing, rolls, and any other form of picture imperfection. Produce commentary of the camera operator with proper volume and clarity free from distortion on the audio portion of the recording.
- B. Make video quality 720p HD or greater in MPG, AVCHD, AVI, or MP4 format.
- C. Provide video media on standard Digital Video Disc (DVD) format.

2.2 RECORDED INFORMATION – VIDEO

- A. Record coverage of surface features located within the limits of construction and adjacent zones of influence including, but not be limited to, entire designated easements, entire roadways, roadway signage (type of sign to be noted in commentary), pavements, ditches, walls, curbs, driveways (zoom in and hold on driveway, from street to garage, for minimum 5 seconds), sidewalks, culverts,

buildings, raised pavement markings, landscaping, shrubbery and fences. Note the existence of faults, fractures, defects, and such. Limit video coverage to one side of the site, street, easement or right-of-way at any one time. Include surface conditions located within the zone of influence of construction supported by appropriate audio description including the location relative to construction stations. Sufficiently control panning, zoom-in and zoom-out rates to maintain a clear view of the object.

- B. Display continuously and simultaneously the date and time of recording on the video. Generate the video recordings with the actual recording date and time as transparent digital information. Show the month, day and year on the date information.

2.3 RECORDED INFORMATION – AUDIO

- A. Provide corresponding and simultaneously recorded audio recording to the video consisting of the original live recorded audio. Begin each recording with the recorded date, project name followed by the general location, i.e., viewing side and direction of progress. Record exclusively the narrative commentary of the electrographer, recorded simultaneously with the fixed elevation video record of the zone of influence of construction to assist in viewer orientation and in any needed identification, differentiation, clarification, or objective description of the features being shown in the video portion of the recording, including location relative to construction stations. Provide the audio recording free from any conversations between the camera operator and any other production technicians.

2.4 VIDEO MEDIA INDEXING

- A. Video Identification: Permanently label video media with number and project name and location.
- B. Video Logs: Provide each video with a log of that video's contents that describes the various segments of coverage contained on the video in terms of the names of the streets or easements, coverage beginning and end, directions of coverage, video unit counter numbers, and date.
- C. Video Index: Provide, by electrographer, an index listing, in order by video number, each video number and a brief description of coverage contained on that video, including engineering station numbers.

PART 3 EXECUTION

3.1 GENERAL

- A. Complete video recording not more than six weeks prior to commencement of project construction.

- B. Engage the services of a professional videographer. Prepare the color audio-video recordings by a responsible commercial firm known to be skilled and regularly engaged in the business of preconstruction color audio-video documentation.
- C. Review the video recordings for clarity and accuracy, and make supplemental records of existing conditions if they are not clearly indicated.
- D. Notify the ENGINEER and RESIDENT PROJECT REPRESENTATIVE two weeks prior to commencement of construction within a specific geographic area in order to obtain the preconstruction video.
- E. The OWNER will retain ownership of the preconstruction videos after construction.

3.2 VISIBILITY

- A. Perform recordings during times of good visibility. Do not record during periods of significant precipitation, mist or fog. Complete recording when sufficient sunlight is present to properly illuminate the subject, and to produce bright, sharp video recordings of those subjects. Do not record when more than 10% of the area to be recorded contains debris or obstructions unless otherwise approved by the RESIDENT PROJECT REPRESENTATIVE.

3.3 COVERAGE

- A. Provide coverage consisting of a single, continuous, unedited recording which begins at one end of a particular construction area and proceeds uninterrupted to the other end of the construction area in order to increase the continuity of coverage.
- B. Provide the average rate of travel during a particular segment of coverage (e.g., coverage of one side of a street) indirectly proportional to the number, size, and value of the surface features within that construction area's zone of influence not exceeding one-half mile per hour.

3.4 CAMERA OPERATION

- A. Camera Height and Stability: If conventional wheeled vehicles are used as conveyances for the recording system, maintain a vertical distance between the camera lens and the ground equal to ten feet or less. Firmly mount the camera such that transport of the camera during the recording process will not cause an unsteady picture.
- B. Camera Control: Sufficiently control camera pan, tilt, zoom-in, and zoom-out rates such that recorded objects will be clearly viewed during video playback. Properly control or adjust other camera and recording system controls such as lens focus and aperture, video level, pedestal, chroma, white balance, and electrical focus to maximize picture quality.

- C. Viewer Orientation Techniques: Maintain viewer orientation on the audio and video portions of the recording. Utilize visual displays of visible building addresses. In locations, such as easements, where the proposed construction location will not be readily apparent to the video viewer, indicate the proposed centerline of construction.

END OF SECTION

SECTION 01 45 00
QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Inspection Services
- B. Inspection of Materials
- C. Quality Control
- D. Costs of Inspection
- E. Acceptance Tests
- F. Failure to Comply with Contract

1.2 RELATED SECTIONS

Related Work specified in other sections includes, but is Not Limited to, the Following

- A. Section 01 33 00 - Submittals: Specific Submittal Requirements

1.3 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1.
- B. Certificate Submittals: Furnish the ENGINEER authoritative evidence in the form of Certificates of Manufacture that the materials and equipment to be used in the Work have been manufactured and tested in conformity with the Contract Documents. Include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

1.4 INSPECTION SERVICES

- A. OWNER's Access: At all times during the progress of the Work and until the date of final completion, afford the OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE every reasonable, safe, and proper facility for inspecting the Work at the site. The observation and inspection of any work will not relieve the CONTRACTOR of any obligations to perform proper and satisfactory work as

specified. Replace work rejected due to faulty design, inferior, or defective materials, poor workmanship, improper installation, excessive wear, or nonconformity with the requirements of the Contract Documents, with satisfactory work at no additional cost to the OWNER. Replace as directed, finished or unfinished work found not to be in strict accordance with the Contract, even though such work may have been previously approved and payment made therefor.

- B. Rejection: The OWNER, ENGINEER, and the RESIDENT PROJECT REPRESENTATIVE have the right to reject materials and workmanship which are defective or require correction. Promptly remove rejected work and materials from the site.
- C. Inferior Work Discoveries: Failure or neglect on the part of the OWNER, ENGINEER, or the RESIDENT PROJECT REPRESENTATIVE to condemn or reject bad or inferior work or materials does not imply an acceptance of such work or materials. Neither is it to be construed as barring the OWNER, ENGINEER or the RESIDENT PROJECT REPRESENTATIVE at any subsequent time from recovering damages or a sum of money needed to build anew all portions of the Work in which inferior work or improper materials were used.
- D. Removal for Examination: Should it be considered necessary or advisable by the OWNER, ENGINEER or the RESIDENT PROJECT REPRESENTATIVE, at any time before final acceptance of the Work, to make examinations of portions of the Work already completed, by removing or tearing out such portions, promptly furnish all necessary facilities, labor, and material, to make such an examination. If such Work is found to be defective in any respect, defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the cost of examination and restoration of the Work will be considered a change in the Work to be paid for in accordance with applicable provisions of the Contract.
- E. Operation Responsibility: Assume full responsibility for the proper operation of equipment during tests and instruction periods. Make no claim for damage which may occur to equipment prior to the time when the OWNER accepts the Work.
- F. Rejection Prior to Warranty Expiration: If at anytime prior to the expiration of any applicable warranties or guarantees, equipment is rejected by the OWNER, repay to the OWNER all sums of money received for the rejected equipment on progress certificates, and upon the receipt of the sum of money, OWNER will execute and deliver a bill of sale of all its rights, title, and interest in and to the rejected equipment. Do not remove the equipment from the premises of the OWNER until the OWNER obtains from other sources, equipment to take the place of that rejected. The OWNER hereby agrees to obtain other equipment within a reasonable time and the CONTRACTOR agrees that the OWNER may use the equipment furnished by the CONTRACTOR without rental or other charge until the other new equipment is obtained.

1.5 INSPECTION OF MATERIALS

- A. Premanufacture Notification: Give notice in writing to the RESIDENT PROJECT REPRESENTATIVE sufficiently in advance of the commencement of manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. When required, notice to include a request for inspection, the date of commencement, and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, RESIDENT PROJECT REPRESENTATIVE will coordinate with ENGINEER for material testing and will arrange to have a representative present at such times during the manufacture or testing as may be necessary to inspect the materials, or will notify CONTRACTOR that the inspection will be made at a point other than the point of manufacture or testing, or that the inspection will be waived. Comply with these provisions before shipping any materials. Such inspection will not constitute a release from the responsibility for furnishing materials meeting the requirements of the Contract Documents.
- B. Testing Standards: Conduct tests of electrical and mechanical equipment and appliances in accordance with recognized, applicable test codes except as may otherwise be stated herein.

1.6 QUALITY CONTROL

A. Testing

1. Field and Laboratory

- a. Provide personnel to assist the ENGINEER in performing the following periodic observation and associated services. Contractor shall coordinate with the RESIDENT PROJECT REPRESENTATIVE in advance of scheduled tests, inspections, or start of major phases of work. The RESIDENT PROJECT REPRESENTATIVE will coordinate with the ENGINEER to provide appropriate staff for field and laboratory testing.
 - (1) Soils: Observe and test excavations, placement and compaction of soils. Determine suitability of excavated material. Observe subgrade soils and foundations.
 - (2) Concrete: Observe forms and reinforcement; observe concrete placement; witness air entrainment tests, facilitate concrete cylinder preparation and assist with other tests performed by ENGINEER.
 - (3) Bituminous HMA: Observe and test HMA Pavement and assist with other tests performed by ENGINEER.

- (4) Masonry: Sample and test mortar and grout; inspect brick and block samples and sample panels; inspect placement of reinforcement and grouting.
 - (5) Structural Steel: Verify that all welders are certified; visually inspect all structural steel welds; mechanically test high-tensile bolted connections.
 - b. When specified in Divisions 2 through 46 of the Contract Documents, provide an independent laboratory testing facility to perform required testing. Qualify the laboratory as having performed previous satisfactory work. Prior to use, submit qualifications to the ENGINEER for approval.
 - c. Cooperate with the ENGINEER and RESIDENT PROJECT REPRESENTATIVE and laboratory testing representatives. Provide RESIDENT PROJECT REPRESENTATIVE at least 24 hours' notice prior to when specified testing is required. Provide labor and materials, and necessary facilities at the site as required by the ENGINEER and the testing laboratory.
 - d. Provide an independent testing agency, a member of the InterNational Electrical Testing Association, to perform inspections and tests specified in Division 26 of these Specifications.
- 2. Equipment: Coordinate and demonstrate test procedures as specified in the Contract Documents or as otherwise required during the formal tests.
- 3. Pipeline and Other Testing: Conform to test procedures and requirements specified in the appropriate Specification Section.

B. Reports

- 1. Certified Test Reports: Where transcripts or certified test reports are required by the Contract Documents, meet the following requirements:
 - a. Before delivery of materials or equipment submit and obtain approval of the ENGINEER for all required transcripts, certified test reports, certified copies of the reports of all tests required in referenced specifications or specified in the Contract Documents. Perform all testing in an approved independent laboratory or the manufacturer's laboratory. Submit for approval reports of shop equipment tests within thirty days of testing. Transcripts or test reports are to be accompanied by a notarized certificate in the form of a letter from the manufacturer or supplier certifying that tested material or equipment meets the specified requirements and the same type, quality,

manufacture and make as specified. The certificate shall be signed by an officer of the manufacturer or the manufacturer's plant manager.

- b. Where witness testing is required for ENGINEER to be in attendance, send out a notification 30-45 days in advance to RESIDENT PROJECT REPRESENTATIVE for coordination with ENGINEER.

- 2. Certificate of Compliance: At the option of the ENGINEER, or where not otherwise specified, submit for approval a notarized Certificate of Compliance. The Certificates may be in the form of a letter stating the following:

- a. Manufacturer has performed all required tests
- b. Materials to be supplied meet all test requirements
- c. Tests were performed not more than one year prior to submittal of the certificate
- d. Materials and equipment subjected to the tests are of the same quality, manufacture and make as those specified
- e. Identification of the materials

1.7 COSTS OF INSPECTION

- A. OWNER's Obligation: Initial inspection and testing of concrete, mortar, grout, pipe manufacturing, pavement, subgrade, backfill, and structural steel furnished under this Contract will be performed by the OWNER or their authorized Representatives or inspection bureaus without cost to the CONTRACTOR. If subsequent testing is necessary due to failure of the initial tests or because of rejection for noncompliance, reimburse the OWNER for expenditures incurred in making such tests.
- B. CONTRACTOR's Obligation: Include in the Contract Price, the cost of all shop and field tests of equipment and other tests required by the Contract Documents except those tests described above under "OWNER's Obligation". The OWNER may perform tests on any material or equipment furnished under this Contract at any time during the Contract. If tests performed by the OWNER result in failure or rejection for noncompliance, reimburse the OWNER for expenditures incurred in making such tests. Tests performed by the OWNER shall prevail in determining compliance with Contract requirements.
- C. Reimbursements to OWNER:
 - 1. Materials and equipment submitted by the CONTRACTOR as the equivalent to those specifically named in the Contract may be tested by the

OWNER for compliance. Reimburse the OWNER for expenditures incurred in making such tests on materials and equipment which are rejected for noncompliance.

2. Reimburse OWNER for the costs of any jobsite inspection outside the regular working hours identified in paragraph 7.02 of General Conditions and 7.02B of Supplementary Conditions.
3. Reimburse OWNER for all costs associated with Witness Tests which exceed 5 Calendar Days per kind of equipment.

1.8 ACCEPTANCE TESTS

- A. Preliminary Field Tests: As soon as conditions permit, furnish all labor and materials and services to perform preliminary field tests of all equipment provided under this Contract. If the preliminary field tests disclose that any equipment furnished and installed under this Contract does not meet the requirements of the Contract Documents, make all changes, adjustments and replacements required prior to the acceptance tests.
- B. Final Field Tests: Upon completion of the Work and prior to final payment, subject all equipment, piping and appliances installed under this Contract to specified acceptance tests to demonstrate compliance with the Contract Documents.
 1. Furnish all labor, fuel, energy, water and other materials, equipment, instruments and services necessary for all acceptance tests.
 2. Conduct field tests in the presence of the ENGINEER. Perform the field tests to demonstrate that under all conditions of operation each equipment item:
 - a. Has not been damaged by transportation or installation
 - b. Has been properly installed
 - c. Has been properly lubricated
 - d. Has no electrical or mechanical defects
 - e. Is in proper alignment
 - f. Has been properly connected
 - g. Is free of overheating of any parts
 - h. Is free of all objectionable vibration
 - i. Is free of overloading of any parts
 - j. Operates as intended
- C. Failure of Tests: If the acceptance tests reveal defects in material, or if the material in any way fails to comply with the requirements of the Contract Documents, then promptly correct such deficiencies. Failure or refusal to correct the deficiencies, or if the improved materials or equipment, when tested again, fail

to meet the guarantees or specified requirements, the OWNER, notwithstanding its partial payment for work and materials or equipment, may reject said materials or equipment and may order the CONTRACTOR to remove the defective work from the site at no addition to the Contract Price, and replace it with material which meets the Contract Documents.

1.9 FAILURE TO COMPLY WITH CONTRACT

- A. Unacceptable Materials: If it is ascertained by testing or inspection that the material or equipment does not comply with the Contract, do not deliver said material or equipment, or if delivered remove it promptly from the site or from the Work and replace it with acceptable material without additional cost to the OWNER. Fulfill all obligations under the terms and conditions of the Contract even though the OWNER or the OWNER's Authorized Representatives fail to ascertain noncompliance or notify the CONTRACTOR of noncompliance.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 45 50

LEAKAGE TESTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Testing for any signs of leakage in pipelines and structures required to be watertight.
 - 1. Test air and gas lines with compressed air.
 - 2. Test other pipelines with water under the specified pressures. For testing performed with water, use only potable water.
- B. Related Work Specified in other sections include, but is not limited to, the following:
 - 1. Section 01 44 00 - Preconstruction Videos
- C. Operation of Existing Facilities: Conduct tests in a manner to minimize as much as possible any interference with the day-to-day operations of existing facilities or other contractors working on or adjacent to the site.

1.2 PERFORMANCE REQUIREMENTS

- A. Written Notification of Testing: Provide written notice when the work is ready for testing, and make the tests as soon thereafter as possible.
 - 1. Personnel for reading meters, gauges, or other measuring devices, will be furnished by the CONTRACTOR.
 - 2. Furnish other labor, equipment, air, water and materials, including sample taps, corporation stops, meters, backflow preventers, gauges, smoke producers, blowers, pumps, pipes, compressors, fuel, water, bulkheads, permits, and accessory equipment.

1.3 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances

1.4 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings, Product Data, and Information:
 - 1. Leak testing plan showing proposed testing method, procedures, and recording procedures.
 - 2. A color audio-visual recording of the entire inside of the pipelines constructed prior to final acceptance of the Work. Provide video with media, information, audio, indexing, visibility, coverage, and operation in accordance with Section 01 44 00.
- C. Quality Control:
 - 1. Testing Report: Prior to placing the pipeline in service, submit for review and approval a detailed bound report summarizing the leakage test data and results, describing the test procedure and showing the calculations on which, the leakage test data is based.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PRESSURE TESTS OF BURIED OR CONCEALED PIPELINES

- A. Testing: Completely backfill harnessed sections of buried piping before such sections are tested.
 - 1. Pressure test buried or concealed pipelines for leakage by maintaining the fluid in the pipe at the specified pressure for a minimum period of 2 hours.
 - 2. Pressure test the piping for leakage as a whole or in sections, valved or bulkheaded at the ends. Apply the specified pressure to the piping through a tap in the pipe by means of a hand pump or other approved method. Do not use air for testing.
- B. Test Pressures: Pressure test new pipe in accordance with AWWA C600 and these specifications. Test the piping at the test pressures specified in Section 33 05 50.
 - 1. For test pressures expressed in terms of the Hydraulic Grade Line (HGL), determine the test pressure by using the following formula. For example, if the specified test pressure is an HGL of 1,150 feet and the pipeline test

station location pressure sensor is at elevation 900 feet (PSEL), then the test pressure will be 108 psi $((1,150 \text{ ft} - 900 \text{ ft})/2.31 = 108 \text{ psi})$.

$$P = \frac{\text{HGL (ft)} - \text{PSEL (ft)}}{2.31}$$

in which P is the test pressure in psi gauge, HGL is the Hydraulic Grade Line in feet, and PSEL is the pipeline test station location pressure sensor elevation in feet.

- C. Allowable Leakage: Stop visible leakage. Do not allow leakage for any piping, as determined by the above test, to exceed the allowable leakage for pipelines as given by the following formula in Section 5.2 of AWWA C600:

$$L = \frac{S \times D \times (P)^{1/2}}{148,000}$$

in which L is the allowable leakage in gallons per hour, S is the length of pipeline tested in feet, D is the nominal diameter of the pipe in inches and P is the average test pressure in psi gauge.

- D. Provide means to directly measure quantities of water added during the test to maintain the prescribed pressure.

3.2 VALVE TESTING

- A. Testing: Operate valves in the section under test through several complete cycles of closing and opening. In addition, have the test pressure for each valve, when in the closed position, applied to one side of the valve only. Test each end of the valve in this manner.

1. Test valves in place, as far as practicable, and correct any defects in valves or connections.

- B. Test Pressure: Test each valve at the same test pressure as that specified for the pipe in which the valve is installed.

- C. Leakage: Stop external and internal leakage through the valves.

- D. Movement: Stop valve movement or structural distress.

3.3 REPAIR OF PIPING LEAKS

- A. Procedures: Repair leaks as follows:

1. Replace broken pipe or joint assemblies found to leak.

2. When leakage occurs in excess of the specified amount, locate and repair defective valves, pipe, cleanouts or joints.
3. If the excess leakage is determined to be caused by defective materials furnished, improper workmanship, or damage to the materials, make the necessary repairs or replacements at no addition to the Contract Price.
4. If defective portions cannot be located, remove and reconstruct as much of the original work as necessary to obtain piping that meets the leakage requirements specified herein and retest, at no addition to the Contract Price.

END OF SECTION

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General Requirements
- B. Temporary Utilities
- C. Temporary Construction
- D. Barricades and Enclosures
- E. Fences
- F. Security
- G. Temporary Controls
- H. Traffic Regulation
- I. Field Offices and Sheds
- J. RESIDENT PROJECT REPRESENTATIVE's Field Office

1.2 GENERAL REQUIREMENTS

- A. Facilities: Furnish, install, maintain and remove all falsework, scaffolding, ladders, hoistways, braces, pumping plants, shields, trestles, roadways, sheeting, centering forms, barricades, drains, flumes, and the like, any of which may be needed in the construction of any part of the Work and which are not herein described or specified in detail. Accept responsibility for the safety and efficiency of such works and for any damage that may result from their failure or from their improper construction, maintenance or operation.
- B. First Aid: Maintain a readily accessible, completely equipped first aid kit at each location where work is in progress.
- C. Safety Responsibility: Accept sole responsibility for safety and security at the site. Indemnify and hold harmless the OWNER, ENGINEER, and the RESIDENT PROJECT REPRESENTATIVE, for any safety violation, or noncompliance with governing bodies and their regulations, and for accidents, deaths, injuries, or damage

at the site during occupancy or partial occupancy of the site by CONTRACTOR's forces while performing any part of the Work.

- D. Safety Program: Furnish two copies of the CONTRACTOR's Safety Program before beginning on site activities. Furnish two copies of amendments to Safety Program as they are prepared.
- E. Hazard Communication: Furnish two copies of the CONTRACTOR's Hazard Communication Program required under the latest OSHA regulations before beginning on site activities. Furnish two copies of amendments to Hazard Communications Program as they are prepared. Submit a statement on the CONTRACTOR's letterhead, signed by the CONTRACTOR's contracting authority, attesting that the Hazard Communication Program is in compliance with OSHA regulations. The submitted Hazard Communication Program will not be reviewed by the OWNER, ENGINEER, or RESIDENT PROJECT. Action on the submitted Hazard Communication Program will be limited to verification that the CONTRACTOR has submitted their Hazard Communication Program and has certified compliance with applicable regulations.

1.3 TEMPORARY UTILITIES

- A. Water: Provide all necessary and required water without additional cost, unless otherwise specified. If necessary, provide and lay water lines to the place of use; secure all necessary permits; pay for all taps to water mains, hydrants and for all water used at the established rates.
- B. Light and Power: Provide without additional cost to the OWNER temporary lighting and power facilities required for the proper construction and inspection of the Work. If, in the RESIDENT PROJECT REPRESENTATIVE's opinion, these facilities are inadequate, do NOT proceed with any portion of the Work affected thereby. Maintain temporary lighting and power until the Work is accepted.
- C. Heat: Provide temporary heat without additional cost to the OWNER, whenever required, for work being performed during cold weather to prevent freezing of concrete, water pipes, and other damage to the Work or existing facilities.
- D. Sanitary Facilities: Provide sufficient sanitary facilities for construction personnel without additional cost to the OWNER. Prohibit and prevent nuisances on the site of the Work or on adjoining property. Discharge any employee who violates this rule. Abide by all environmental regulations or laws applicable to the Work.
- E. Connections to Existing Utilities:
 - 1. Unless otherwise specified or indicated, make all necessary connections to existing facilities including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electricity. In each case, obtain permission from

the OWNER or the owning utility prior to undertaking connections. Protect facilities against deleterious substances and damage.

2. Thoroughly plan in advance all connections to existing facilities. Have on hand at the time of undertaking the connections, all material, labor and required equipment. Proceed continuously to complete connections in minimum time. Arrange for the operation of valves or other appurtenances on existing utilities, under the direct supervision of the owning utility.

1.4 TEMPORARY CONSTRUCTION

- A. Bridges: Design and place suitable temporary bridges where necessary for the maintenance of vehicular and pedestrian traffic. Assume responsibility for the sufficiency and safety of all such temporary work or bridges and for any damage which may result from their failure or their improper construction, maintenance, or operation. Indemnify and hold harmless the OWNER, ENGINEER and the RESIDENT PROJECT REPRESENTATIVE from all claims, suits or actions, and damages or costs of every description arising by reason of failure to comply with the above provisions.

1.5 BARRICADES AND ENCLOSURES

- A. Protection of Workmen and Public: Erect and maintain at all times during the prosecution of the Work, barriers and lights necessary for the protection of Workmen and the Public. Provide suitable barricades, lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the Work causes obstructions to normal traffic, excavation sites, or constitutes in any way a hazard to the public.
- B. Barricades and Lights:
 1. Protect all streets, roads, highways, excavations and other public thoroughfares which are closed to traffic; use effective barricades which display acceptable warning signs. Locate barricades at the nearest public highway or street on each side of the blocked section.
 2. Statutory Requirements: Install and maintain all barricades, signs, lights, and other protective devices within highway rights-of-way in strict conformity with applicable statutory requirements by the authority having jurisdiction.

1.6 FENCES

- A. Existing Fences: Obtain written permission from the OWNER prior to relocating or dismantling fences which interfere with construction operations. Reach agreements with the fence owner as to the period the fence may be left relocated or dismantled. Install adequate gates where fencing must be maintained. Keep gates closed and locked at all times when not in use.

- B. Restoration: Unless otherwise shown, replace fences either damaged or removed during construction activities with new materials of same type, size, and height, including gates, gate posts and line posts. The use of temporary fencing is required as necessary to maintain the integrity of fence systems which impound animals.

1.7 SECURITY

A. Preservation of Property:

1. Preserve from damage, all property along the line of the Work, in the vicinity of or in any way affected by the Work, the removal or destruction of which is not called for by the Drawings. Preserve from damage, public utilities, trees, lawn areas, building monuments, pipe and underground structures, and public streets. Note: Normal wear and tear of streets resulting from legitimate use by the CONTRACTOR are not considered as damage. Whenever damages occur to such property, immediately restore to its original condition. Costs for such repairs are incidental to the Contract.
2. In case of failure on the part of the CONTRACTOR to restore property or make good on damage or injury, the OWNER may, upon 24 hours written notice, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any moneys due or which may become due to the CONTRACTOR under this Contract. If removal, repair or replacement of public or private property is made necessary by alteration of grade or alignment authorized by the OWNER and not contemplated by the Contract Documents, the CONTRACTOR will be compensated, in accordance with the General Conditions, provided that such property has not been damaged through fault of the CONTRACTOR or the CONTRACTOR's employees.

B. Public Utility Installations and Structures:

1. Public utility installations and structures include all poles, tracks, pipes, wires, conduits, vaults, manholes, and other appurtenances and facilities, whether owned or controlled by public bodies or privately owned individuals, firms or corporations, used to serve the public with transportation, gas, electricity, telephone, storm and sanitary sewers, water, or other public or private utility services. Facilities appurtenant to public or private property which may be affected by the Work are deemed included hereunder.
2. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. Existing public utility installations and structures are indicated on the Drawings only to the extent such information was made available to, or found by, the ENGINEER in preparing the Drawings. These data are not guaranteed for completeness or accuracy, and the CONTRACTOR is responsible for making

necessary investigations to become fully informed as to the character, condition, and extent of all public utility installations and structures that may be encountered and that may affect the construction operations.

3. Contact utility locating service sufficiently in advance of the start of construction to avoid damage to the utilities and delays to the completion date. Call diggers hotline at (811) or (800) 242-8511 72 hours in advance of work to obtain the location of existing underground utilities to avoid damage to the utilities and delays to the completion date. Provide 72 hours' notice prior to the start of work in those areas to a designated locating service, utilities, governmental agencies and others reasonably assumed to have above and below ground utilities within the limits of construction. Excavation work shall not commence in any area where underground utilities have not been located.
4. Remove, replace, relocate, repair, rebuild, and secure any public utility installations and structures damaged as a direct or indirect result of the Work under this Contract. Costs for such work are incidental to the Contract. Contractor will be responsible and liable for any consequential damages done to or suffered by any public utility installations or structures. Assume and accept responsibility for any injury, damage, or loss which may result from or be consequent to interference with, or interruption or discontinuance of, any public utility service.
5. Repair or replace in kind any water, electric, sewer, gas, or other service connection damaged during the Work with no addition to the Contract price.
6. At all times in performance of the Work, employ proven methods and exercise reasonable care and skill to avoid unnecessary delay, injury, damage, or destruction to public utility installations and structures. Avoid unnecessary interference with, or interruption of, public utility services. Cooperate fully with the owners thereof to that end.
7. Give written notice to the owners of all public utility installations and structures affected by proposed construction operations, at least 72 hours in advance of breaking ground in any area or on any unit of the Work, to obtain their permission before disrupting the lines and to allow them to take measures necessary to protect their interests. Advise the Chiefs of Police, Fire and Rescue Services of any excavation in public streets or the temporary shut-off of any water main. Provide at least 24 hours' notice to all affected property owners whenever service connections are taken out of service.

C. Maintenance of Public Services:

1. Temporarily remove and relocate existing mailboxes in order to maintain mail service during construction. If post is deteriorated, replace post and bracket and attach existing mailbox and paper box to new post. Re-install mailboxes in the original location at end of each day or provide temporary mailbox

clusters where permanent mailboxes are not accessible for delivery due to construction.

2. Maintain access for refuse collection for the duration of the project. Coordinate with residents and business for collection days and typical placement of refuse containers.
- D. Work on Private Property: Work on this project will require operations on private property, rights of way or easements. The OWNER has secured the appropriate easements or rights of entry from the affected property owners. Comply with all easement or rights of entry provisions including the following:
 - E. Conduct operations along rights-of-way and easements through private property to avoid damage to the property and to minimize interference with its ordinary use. Upon completion of the Work through such property, restore the other structures disturbed by the construction as nearly as possible to the preconstruction conditions. Restore all grades and facilities disturbed by construction activities to the original condition or better in accordance with the requirements of the authority having jurisdiction. Unless otherwise shown, replace fences either damaged or removed during construction activities with new materials of same type, size, and height, including gates, gate posts and line posts. Do not remove any material from private property without the consent of the property owner or responsible party in charge of such property. Hold harmless the OWNER from any claim or damage arising out of or in connection with the performance of work across and through private property.
 - F. Miscellaneous Structures: Assume and accept responsibility for all injuries or damage to culverts, building foundations and walls, retaining walls, or other structures of any kind met with during the prosecution of the Work. Assume and accept liability for damages to public or private property resulting therefrom. Adequately protect against freezing all pipes carrying liquid.
 - G. Protection of Trees, Shrubs, and Lawn Areas:
 1. Protect trees, shrubs, and lawn area as specified in Section 31 10 00.
- 1.8 TEMPORARY CONTROLS
- A. During Construction:
 1. Keep the site of the Work and adjacent premises free from construction materials, debris, and rubbish. Remove this material from any portion of the site if such material, debris, or rubbish constitutes a nuisance or is objectionable.
 2. Remove from the site all surplus materials and temporary structures when they are no longer needed.

3. Neatly stack construction materials such as concrete forms and scaffolding when not in use. Promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.
4. Properly store volatile wastes in covered metal containers and remove from the site daily.
5. Do not bury or burn on the site or dispose of into storm drains, sanitary sewers, streams, or waterways, any waste material. Remove all wastes from the site and dispose of in a manner complying with applicable ordinances and laws.
6. Dispose of all food-related trash items such as wrappers, cans, bottles, and food scraps in closed containers, and remove at least once a week from a construction or project site.
7. Only store equipment in roadway right-of-way provided it is protected from traffic using k-rails or other barriers. Do not disrupt traffic flows with storage of materials and equipment within the right-of-way and obtain approval by the authority having jurisdiction.
8. Immediately remove stored materials and equipment if the OWNER or an approved representative deems the placement disruptive to traffic or the public.
9. Only store material in roadway right-of way provided it is protected and does not pose a safety factor for the public. Storage of material must be within 500 feet of the active Work area and may not be stored in one location for more than three days.
10. Ensure that spotlights, light towers and any other form of site lighting are positioned minimize light pollution from spill light into residences.

B. Smoke Prevention:

1. Strictly observe all air pollution control regulations.
2. Open fires will not be allowed.

C. Noises:

1. Maintain acceptable noise levels in the vicinity of the Work per local requirements. Limit noise production to acceptable levels by using special mufflers, barriers, enclosures, equipment positioning, and other approved methods.

2. Ensure construction activities meet municipal code requirements related to noise.
3. Locate fixed construction equipment (such as compressors and generators) and construction staging areas as far as possible from nearby sensitive receptors including residences, schools, and hospitals.
4. Coordinate with facility owners or administrators of sensitive land uses such as police and fire stations, transit stations, hospitals, and schools. Provide advance notification to the facility owner or operator of the timing, location, and duration of significant noise producing construction activities.

D. Crack Survey:

1. Collaborate with the OWNER to conduct crack surveys in the case of jack and bore drilling within 15 feet of any structure. Perform surveys with photographs, video, or visual inventory, and include inside as well as outside locations. Document all existing cracks in walls, floors, and driveways with sufficient detail for comparison after construction to determine whether actual vibration damage occurred.
2. Collaborate with the OWNER to conduct post-construction surveys to document the condition of the surrounding buildings after the construction is complete.

E. Hours of Operation:

1. Operation of construction equipment outside the hours indicated in Division 0 is prohibited. For operation of this equipment during this period obtain written consent from the OWNER.
2. Do not carry out nonemergency work, including equipment moves, on Saturdays, Sundays and holidays defined in Division 0 without prior written authorization by the OWNER.
3. Inform the OWNER when emergency work is required, which may be done without prior permission.

F. Dust Control:

1. Submit for approval, and then implement, a Dust Control Plan to the ENGINEER at least 30 days prior to the start of any construction field activity. Include the following measures in the Dust Control Plan.
2. Limit dust on the site and the roadways in and around the site. Perform dust control operations to prevent construction operations from producing dust in

amounts harmful to persons or causing a nuisance to persons living nearby or occupying buildings in the vicinity of the Work. Take measures to prevent unnecessary dust. Keep earth surfaces exposed to dusting moist with water or a chemical dust suppressant. Cover materials in piles or while in transit to prevent blowing or spreading dust. Comply with all other requirements of the authority having jurisdiction. Adequately protect buildings or operating facilities which may be affected adversely by dust. Protect machinery, motors, instrument panels, or similar equipment by suitable dust screens. Include proper ventilation with dust screens.

3. Perform dust control operations to prevent construction operations from producing dust in amounts harmful to persons or causing a nuisance to persons living nearby or occupying buildings in the vicinity of the Work.
4. Take measures to prevent unnecessary dust. Keep exposed earth surfaces moist with water or a chemical dust suppressant. Cover granular materials while in transit to prevent blowing or spreading dust.
5. Control fugitive dust emissions from all land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities by utilizing application of water (at least two times per day or as needed) or by presoaking.
6. When transporting materials offsite, cover all materials or effectively wet materials to limit visible dust emissions, and maintain at least six inches of freeboard space from the top of the container.
7. Adequately protect buildings or operating facilities which may be affected adversely by dust. Protect machinery, motors, instrument panels, or similar equipment by suitable dust screens. Include proper ventilation with dust screens.
8. Clean roadways which have accumulated dust and debris as needed or as required by the RESIDENT PROJECT REPRESENTATIVE.
9. Limit or expeditiously remove the accumulation of mud or dirt from public roadways used as site access at the end of each Work day. However, the use of blower devices is not acceptable, and the use of dry rotary brushes is not acceptable except when preceded or accompanied by sufficient wetting to limit the visible dust emissions.
10. Immediately remove trackout when it extends 25 or more feet from the site and at the end of each Workday, including slurry and dust from pavement saw cut operations.
11. Install wheel washers for all exiting trucks or wash off all trucks and equipment leaving the site.

12. Limit area subject to excavation, grading, and other construction activity at any one time.

G. Temporary Drainage Provisions:

1. Provide for the drainage of stormwater and any water applied or discharged on the site in performance of the Work. Provide adequate drainage facilities to prevent damage to the Work, the site, and adjacent property.
2. Supplement existing drainage channels and conduits as necessary to convey all increased runoff from construction operations. Construct dikes as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect the OWNER's facilities and the Construction Area, and to direct water to drainage channels or conduits. Provide ponding as necessary to prevent downstream flooding.
3. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

H. Erosion Control: Provide erosion control in accordance with Section 31 25 00.

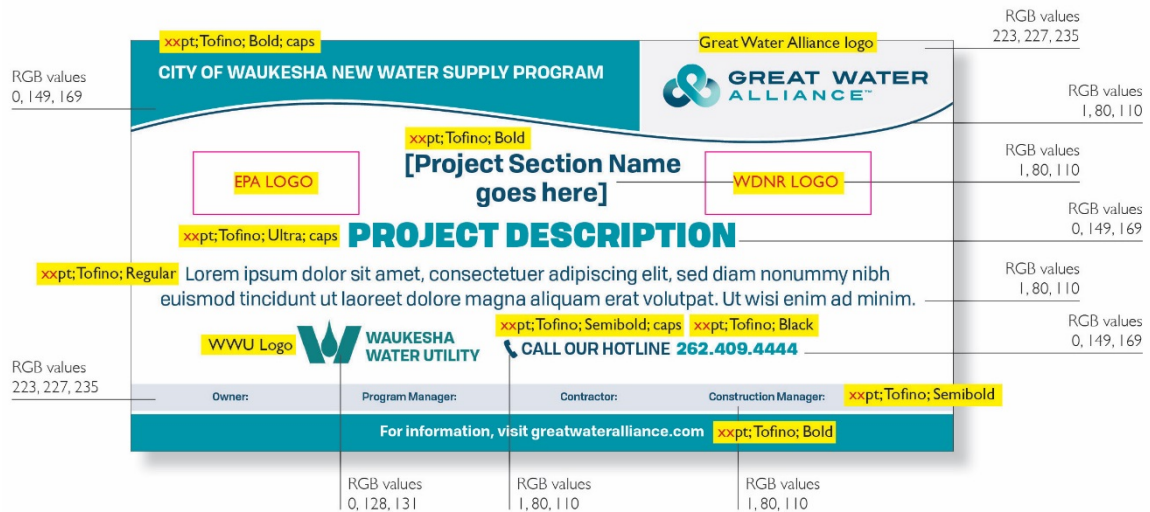
I. Pollution: Prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. Do not permit sanitary wastes to enter any drain or watercourse other than sanitary sewers. Do not permit sediment, debris, or other substances to enter sanitary sewers.

1. Report hazardous spills of chemical, pollutant, lubricant, or similar per guidelines from Wisconsin Department of Natural Resources.

J. Project Signage:

1. Provide three copies of the two signs specified below. Place each of the two signs at every construction site during construction. These sign guidance sections represent the general layout of the signs, but actual words will vary. Coordinate with the OWNER to obtain the final sign layout and wording. While guidelines for placement are included below, final locations for installation will be determined and coordinated with the RESIDENT PROJECT REPRESENTATIVE. Maintain signs and supports, clean and repair deterioration and damage. Remove signs, framing, supports, and foundations at completion of project and restore area.
2. Great Water Alliance Construction Sign
 - a. Develop a sign to identify the project's funding sources, utilizing the template shown below.

- b. In the signs, incorporate relevant logos, i.e. Safe Drinking Water Loan Program (SDWLP), U.S. Environmental Protection Agency and any other logo as needed and dependent on the funding sources, and design in like manner as shown below.
- c. Space logos equally along the length of the sign and at least 1-1/2" below the top of the sign.
- d. Center the funding sign verbiage across the length of the sign in the largest Tofino font possible to incorporate the entire message.
- e. Construct the sign with 1/2" single face omega board (4'x8').
- f. Provide the sign background on white omega board with four-color process print as specified. Provide sign edges with covered and trimmed white vinyl edge (typical omega board finish).
- g. Unless otherwise directed, the sign shall become the property of the OWNER upon completion of the project.
- h. No direct payment will be made for the project sign. All costs for the sign are incidental to the Contract.
- i. Attach sign to two 4'x4' wolmanized posts (painted white) 10' long with a minimum bury of 3'.
- j. Provide post 2' on-center from edges of sign and flush top of posts with top of sign.
- k. Fasten sign to post with six 3/8"x 3 1/2" galvanized lag bolts with galvanized cut washer. Three per post, 6" from top/bottom and at 2' midpoint. Bolt heads are to be painted with enamel paint to match the sign colors.
- l. Original artwork and design files will be provided by the OWNER.
- m. Post project signage before construction commences.
- n. Develop signs with graffiti-proof coating.



3. Construction Information Signage

- a. A sign shall be developed that describes permitted construction days and hours, a day and evening contact number for the job site, and a contact number in the event of problems. This shall utilize the template shown below.
- b. The sign shall be posted at the construction site, visible to the public.
- c. The sign shall be constructed with ½” single face omega board (4’x8’).
- d. The sign background shall be on white omega board with four-color process print as specified. Sign edges shall be covered and trimmed white vinyl edge (typical omega board finish).
- e. The CONTRACTOR shall erect and maintain the sign until the project is completed and accepted.
- f. Unless otherwise directed, the sign shall become the property of the OWNER upon completion of the project.
- g. No direct payment will be made for the project sign. All costs for the sign are incidental to the Contract.

CITY OF WAUKESHA NEW WATER SUPPLY PROGRAM		Great Water Alliance logo	
CONSTRUCTION RULES			
JOB ADDRESS FPO		RGB values 0, 149, 169	
JOB DESCRIPTION FPO		RGB values 0, 149, 169	
<ul style="list-style-type: none"> Noise ordinance will be strictly enforced <ul style="list-style-type: none"> No radios or music shall be audible beyond the construction site property line. 		RGB values 1, 80, 110	
<ul style="list-style-type: none"> Construction Hours <ul style="list-style-type: none"> CONSTRUCTION HOURS 		RGB values 1, 80, 110	
<ul style="list-style-type: none"> Parking <ul style="list-style-type: none"> No Blocking of Adjacent Driveways, No Blocking of Traffic Flow 		RGB values 1, 80, 110	
<ul style="list-style-type: none"> Contact Phone Numbers - 24 hours / 7 days a week <ul style="list-style-type: none"> Builder: BUILDER NAME Telephone #: TELEPHONE NUMBER 			
IF NO RESPONSE BY BUILDER CALL		RGB values 1, 80, 110	
262.409.4444 info@greatwateralliance.com greatwateralliance.com		RGB values 0, 149, 169	
THIS NOTICE IS REQUIRED TO BE POSTED ON THIS JOB SITE AT ALL TIMES		RGB values 0, 149, 169	

4. The OWNER will provide temporary neighborhood business signage (sign board only) for the purpose of directing the public to the various businesses within the Construction area. The CONTRACTOR is responsible for the installation, maintenance, and relocation of these signs as necessary. No direct payment will be made for the temporary neighborhood business signage and the costs for the temporary neighborhood business signs are incidental to the contract.

1.9 TRAFFIC REGULATION

A. Parking:

1. Provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Contract, to avoid any need for parking personal vehicles where they may interfere with public traffic or construction activities.
2. Parking vehicles is permitted on public streets on which parking is permitted by local and state codes and ordinances. Do not block access to property owners.
3. When site space is not adequate, provide additional off-site parking.
4. Maintain traffic and parking areas. Areas shall remain clear of excavated material, construction equipment, material products, and mud.

5. Maintain existing paved areas used for construction that are not called out to be removed; promptly repair breaks, potholes, low areas, standing water, and other deficiencies caused by construction. Repairs these areas to preconstruction condition at a minimum or as specified.
6. Remove mud from vehicle wheels before exiting the construction site.

B. Access:

1. Conduct Work in a manner with minimal interference to public travel, whether vehicular or pedestrian. Provide and maintain suitable and safe bridges, detours, or other temporary routes for the accommodation of public and private travel.
2. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, whether public or private, give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when the CONTRACTOR has obtained permission from the owner or tenant of private property, or from the authority having jurisdiction over the public property involved, to obstruct traffic at the designated point.
3. Prepare and submit a report to the RESIDENT PROJECT REPRESENTATIVE that identifies the driveways, property access points, and sidewalks that will be affected within each road segment that will be closed and the duration the driveway, property access point, or sidewalk will be affected and inaccessible. Prepare and submit the report as a supplement to the construction schedule, and update and submit along with the traffic control plans that will be prepared for each road segment that will be closed.
4. Reinstate these driveways, property access points, or sidewalks accessible within 36 hours of making them inaccessible.
5. Provide an ADA compliant access option for any Works involving closing or restricting access to a driveway or sidewalk.
6. Protect to the greatest extent possible the sidewalks immediately adjacent to the pipeline trench. These sidewalks must be completely repaired or reconstructed before final paving operations are performed and before the CONTRACTOR moves on to the next road segment that will be closed. In all cases, maintain safe access to properties until the sidewalk repair or replacement is complete.
7. Maintain access to driveways and property access points not directly affected by trenching and pipeline installation operations but affected by the CONTRACTOR's work zone.

8. Provide for the safe passage of pedestrians and vehicles to these properties during working hours.
9. Under no circumstances restrict access to properties during non-working hours without prior notice undertaken in collaboration with the OWNER.
10. Ensure access for emergency vehicles is maintained at all times.
11. Maintain business access during business hours, with construction wait times no longer than 10 minutes.
12. Maintain residential access with limited duration closures during construction activity. No overnight closures permitted unless prior written authorization obtained.
13. Replace in-kind all signs and street marking damage caused by or related to the construction of projects. In the case of partial damage to lane stripes and traffic lettering replace the whole stripe or marking in its entirety.
14. Provide the following:
 - a. 72-hour notification to affected residents, businesses, and others on outages and closures;
 - b. 24-hour notification to affected residents, businesses, and others on outages and closures; and
 - c. "Day of" notification to affected residents, businesses, and others on outages and closures.

C. Material Hauling:

1. Submit a haul road plan to the RESIDENT PROJECT REPRESENTATIVE at least 5 day prior to hauling project materials for approval.

1.10 TRAFFIC CONTROL:

- A. Take responsibility of the traffic control Allow for local traffic and maintain access for emergency vehicles at all times.
- B. Provide a Traffic Control Plan for review and approval by the ENGINEER two weeks prior to construction. At a minimum, traffic control will be in accordance with the traffic control plans and WisDOT SDDs included in the Construction Drawings. Obtain approval from WisDOT, Waukesha County, City of Waukesha, Town of Waukesha, and City of New Berlin for alterations to traffic control phases shown on the Drawings. The Traffic Control Plan will meet the requirements of

the WisDOT Permit to Construct, Operate and Maintain Utility Facilities on Highway Right-of-Way for this project and the Drawings.

- C. Comply with roadside safety protocols. Provide “Road Work Ahead” warning signs and speed control (including signs informing drivers of state-legislated double fines for speed infractions in a construction zone) to achieve reductions for safe traffic flow through the Work zone.
- D. All traffic control for utility work and potholing operations will abide by the current editions of:
 - 1. The Wisconsin Manual on Uniform Traffic Control Devices (WMUTCD) and any supplements thereto.
 - 2. The booklet, work zone safety, guidelines for construction, maintenance, and utility operations, published by the Transportation Information Center - LTAP, University Of Wisconsin - Madison.
 - 3. Sections 637 and 643 in WisDOT's Standard Specifications for Highway and Structure Construction.
 - 4. The specific provisions on the Contract Drawings.
 - 5. WisDOT permit conditions.
 - 6. Waukesha County permit conditions.
 - 7. Local requirements and permit conditions for the City of Waukesha, Town of Waukesha, and City of New Berlin.
- E. Wisconsin Lane Closure System (LCS) Notification: Lane, shoulder, ramp closures or encroachments on STH 59/164 require lane closure notification to the Southeast Region Traffic Engineer. The LCS request will be sent to WisDOT for review and approval 14 working days prior to the need for a freeway closure, or 3 working days prior to the need for a non- freeway closure.
- F. Limit, where possible, the pipeline construction Work zone to a width that, at a minimum, maintains alternate one-way traffic flow past the construction zone. Parking may be prohibited if necessary to facilitate construction activities or traffic movement. If the Work zone width will not allow a 10-foot-wide paved travel lane, then the road will be closed to through-traffic (except emergency vehicles) and detour signing on alternative access streets will be used.
- G. No utility work will begin until all appropriate warning signs, devices, and public protection methods are in place and fully functional, which will be maintained until all utility work is complete. For those operations that entirely close or encroach a traffic lane, a proper traffic control plan will be submitted or made

reference to (e.g. Work Zone Safety Booklet page 25) with a utility's permit application.

- H. Warning signs will have prismatic, reflectorized sheeting material that complies with Section 643.2.9.2 of WisDOT's Standard Specifications for Highway and Structure Construction, latest edition. Warning signs will be removed, covered, turned, or laid flat when workers or workers' vehicles are not at the job site or when the signs' messages are not relevant. Barricades and barrels will be reflectorized with Type H reflective sheeting as a minimum. Cones used during nighttime operations will be at least 28 inches in height and reflectorized.
- I. Notify WisDOT 3 working days prior to starting work.
- J. Take responsibility for the erection and maintenance of all barricades, lights and signs necessary for public safety and convenience in accordance with all applicable requirements. In general, all hazards within the limits of the work or on detour around the work must be marked with well-painted, well-maintained barricades, reflectors, electric lights, flashers and warning and directional signs in sufficient quantity and size adequate to protect life and property. These safeguards will be moved, changed, increased or removed as required during the progress of the work to meet changing conditions.
- K. Store all equipment and materials in designated contractor staging areas on or adjacent to the Worksite, in such a manner to minimize obstruction to traffic.
- L. When a street is closed to through traffic, barricades will be placed at the adjacent intersections as well as at the location of the obstruction. Detour signs will be attached to the barricades at the adjacent intersections and along the detour route. Detour signs will be adequately illuminated and/or reflectorized so as to be clearly visible at all times. Include signage to direct pedestrians and bicyclists around project construction Work zones that displace and/or bike lanes.
- M. For street closures, provide details related to the notification of all emergency services, such as police and fire, and other services, such as mail and garbage collection.
- N. Control and monitor construction vehicle movements through the enforcement of standard construction specifications by periodic onsite inspections.
- O. To the extent feasible, and as needed to avoid adverse impacts on traffic flow, schedule truck trips outside of peak morning and evening commute hours. Limit lane closures during peak hours to the extent possible.
- P. Restore roads and streets to normal operations by covering trenches with steel plates outside of normal operation by covering trenches with steel plates outside of allowed working hours or when Work is not in progress.

- Q. The RESIDENT PROJECT REPRESENTATIVE reserves the right to require that "snow fence" be installed at locations where streets or alleys are closed for the full width of the roadway. Barricades will be maintained in rigidly assembled condition. All warning devices will be kept clean and in good repair so as to be readily discernible at all times.
- R. Whenever the operations obstruct or endanger a traffic lane and no marked detour has been provided, furnish a flagman to direct traffic through or around the congested area. The RESIDENT PROJECT REPRESENTATIVE will have the right to require additional flaggers as deemed necessary.
- S. Adequate protection will be provided around all openings wherever required to safeguard the work or the public. All openings and surface obstructions will be protected with barricades, signs and warning devices in accordance with local requirements.
- T. As a minimum, the provisions of the FHWA "Manual for Uniform Traffic Control Devices" will be met. All traffic control procedures will be subject to the approval of the WisDOT and the RESIDENT PROJECT REPRESENTATIVE.
- U. Coordinate with facility owners or administrators of sensitive land uses such as police and fire stations, transit stations, hospitals, and schools. Provide advance notification to the facility owner or operator of the timing, location, and duration of construction activities and the locations of detours and lane closures.
- V. Coordinate construction activities, to extent possible, to minimize traffic disturbances adjacent to schools (e.g., do work during summer months when there is less activity at schools). For construction activities that occur during the school year, then at the start and end of the school day at schools adjacent to a pipeline project, the contractor(s) will provide flaggers in the school areas to ensure traffic and pedestrian safety.
- W. Coordinate with transit providers (e.g. Waukesha Metro Transit and Milwaukee County Transit System) so providers can temporarily relocate bus routes or bus stops in Work zones as it deems necessary.

1.11 TRAFFIC CONTROL DEVICES

- A. Remove all traffic control devices not in use, or that will not be used for a period greater than 24 hours. Do not use the sidewalk area at any time to store unused traffic control devices unless the sidewalk is closed, and an approved barricade plan is provided for rerouting pedestrians.
- B. Maintain all barricades and other traffic control devices in clean and effective condition and replace devices in poor condition immediately.

- C. Install Portable Changeable Message Sign (PCMS) boards, set at each location as depicted on the traffic handling plans, seven days prior to commencing Work. The PCMS boards can be removed once all temporary traffic control features have been implemented to the satisfaction of the OWNER.

1.12 FIELD OFFICES AND SHEDS

- A. CONTRACTOR's Office: At the CONTRACTOR's discretion, erect, furnish, and maintain a field office with a telephone.
- B. Material Sheds and Temporary Structures: Provide material sheds and other temporary structures of sturdy construction and neat appearance if required.
- C. Location: Coordinate location of field offices, material sheds and temporary structures with RESIDENT PROJECT REPRESENTATIVE.

1.13 RESIDENT PROJECT REPRESENTATIVE'S FIELD OFFICE

- A. Sequencing and Scheduling
 - 1. The RESIDENT PROJECT REPRESENTATIVE'S field office trailer shall be ready for occupancy within 45 days after Notice to Proceed, including all electrical, utilities, telecommunication, sewer and water connections, heating, air conditioning, furniture and accessories.
 - 2. All costs associated with the items described in this section shall be included in the CONTRACTOR'S bid price, at no additional cost to the OWNER, except for those items described below as an OWNER cost.
 - 3. The CONTRACTOR shall acquire and pay for all permits that may be needed to install field trailer, temporary parking, and connection to the local road.
 - 4. The duration of the CONTRACTOR'S costs associated with the operation, maintenance, and supply of the field office shall be from the Notice to Proceed until such time as the work is completed and accepted by the OWNER, or a period of 12 months from the Notice to Proceed, whichever is less. Upon completion of the CONTRACTOR's obligation for the field office, the OWNER may choose to transfer the costs associated with the operation, maintenance, and supply of the field office to third party.
 - a. Representatives from the field office trailer rental firm, CONTRACTOR, OWNER, and the third party will review and agree on the condition of the trailer and associated appurtenances.
 - b. The field office trailer rental firm shall transfer the rental agreement to the third party, as designated by the OWNER.

- c. All other monthly costs shall be transferred to the third party, as designated by the OWNER.

B. Utilities

1. As a minimum, provide adequate lighting, heating, air conditioning, sanitary facilities, drinking water, and a telecommunication system for the RESIDENT PROJECT REPRESENTATIVE field offices, in accordance with local codes, as applicable. The CONTRACTOR shall be responsible for all utility and telecommunication connections, any and all costs to provide and maintain service, and maintenance from Notice to Proceed until such time as the work is completed and accepted by OWNER, or a period of 12 months from Notice to Proceed, whichever is less.

C. Maintenance

1. Security: Provide adequate security against fire, theft and other damages for the trailers throughout the duration of the Contract.
2. Cleaning
 - a. Maintain the trailers in a clean and sanitary condition throughout the duration of the Contract. Cleaning shall be performed at least three times each week on a regularly established schedule (Tuesday, Thursday, and Saturday after 6:00 P.M.). These services shall include supplies of toilet paper, paper towels, trashcan liners, dish and hand soap, and cleaning of all floor areas, kitchen areas, lavatories, porch and steps and windows. The CONTRACTOR is to collect all trash from the OWNER or the RESIDENT PROJECT REPRESENTATIVE trailers with each cleaning with removal from the site and proper disposal.
 - b. The Contractor's obligation to clean and maintain this office facility shall extend from Notice to Proceed until such time as the work included under this contract is completed and accepted by OWNER, or a period of 12 months from Notice to Proceed has elapsed, whichever is less. In the event that other construction projects making use of this office facility are not completed at the time of completion of this Contract, the CONTRACTOR shall not be obligated to maintain the office facility beyond the completion of this Contract.
3. Maintenance
 - a. The CONTRACTOR shall provide skilled tradesmen as required to maintain the RESIDENT PROJECT REPRESENTATIVE field office trailers in good condition. This shall include but not necessarily be limited to replacement of light bulbs and ballasts, repair to lavatory

facilities (including all piping and hot water tanks), repair of HVAC units (including replacement of the air filters at least every 3 months), repair to the doors and door hardware, other repairs to the structure (floor, windows, walls, roof, etc.), and repair to the electrical power supply (including replacement of any bad fuses). Repairs shall be completed within 72 hours of notice to CONTRACTOR.

D. Manufactured Units

1. The field offices shall be provided in new or reconditioned like-new condition. Quality and condition of offices shall be acceptable to OWNER and RESIDENT PROJECT REPRESENTATIVE; any offices determined by OWNER or RESIDENT PROJECT REPRESENTATIVE to not be of adequate condition shall be promptly replaced by CONTRACTOR at no additional cost to OWNER. Offices shall be multi-width units, each having a minimum enclosed area of 30 feet x 60 feet (1,800 sf). Reconditioned, like new trailers provided by the CONTRACTOR shall provide the minimum dimensions of the rooms outlined in paragraph D.4. Reconditioned like new trailers shall comply with the electrical and sanitary requirements of paragraph D.5.
2. General Construction: Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.
 - a. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove at completion of Work.
 - b. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.
 - c. Exterior Materials: Weather resistant, finished in one color acceptable to OWNER.
 - d. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.
 - e. Lighting for Offices: 55ft foot candles at desk top height. Exterior door lights to be supplied with photo eyes and halogen bulbs.
 - f. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.
 - g. Orient the trailers onsite in accordance with a layout to be provided by the OWNER prior to Notice to Proceed.

3. Environmental Control:
 - a. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain comfort conditions 68 degrees F heating and 76 degrees F cooling.
4. The office trailer shall include a 11ft x 18ft conference room, a 11ft x 10ft break room area, 4 – 11ft x 10ft offices and 4 – 8ft x 7ft offices. There shall also be lavatory facilities of quantity and size to meet code requirements. An example layout is included at the end of this section.
5. Furnishings:
 - a. Windows: Minimum total area of 10 percent of floor area, with operable sash and insect screens.
 - b. Electrical Distribution Panel: Six 15-amp, 110-volt and one 20-amp, 110-volt circuits, minimum for duplex convenience outlets for each of these trailers. Provide 240-volt breakers for HVAC Units for each trailer. The main electrical panel for each trailer section shall have a minimum 125-amp main breaker.
 - c. Minimum two 110-volt duplex convenience outlets in each office and other designated spaces.
 - d. Sanitary Facilities: Convenient access to private lavatory toilet facilities.
 - e. Drinking Fountain or water cooler: Convenient access by workers.
 - f. Office Furnishings:
 - (1) Each office shall have one desk – 54” x 30” with three drawers; one standard four-drawer letter - size metal filing cabinet with locks and two keys for each lock; one swivel arm chair for desk; two straight chairs; four linear ft of two shelf metal bookshelves and one waste basket for each desk and table.
 - (2) Also provide two drafting tables 36 x 72inch with one equipment drawer and full width parallel straight edge and 2 drafting stools.
 - (3) One metal, double-door storage cabinet under each table.
 - (4) Plan rack to hold working Drawings, shop drawings, and record documents.
 - (5) Two tack boards 36 x 30 inch

- (6) The conference room shall be equipped with conference table(s) for comfortable seating of 16 people and 20 straight back arm chairs for locating around the table; two wall mounted 4' by 8' white boards with 4-color erasable markers (3 sets) and compatible erasers (3), and two 36 by 30-inch wall mounted tack boards.
 - (7) The kitchen area shall be equipped with a round table with seating room for 8 people and 10 matching chairs; minimum 16 cu.ft. refrigerator/freezer combination, two minimum 2 cu.ft. microwave ovens, commercial coffee maker with 3 warming plates, and other accessories to provide a usable and comfortable break area.
- 6. Telephone/Data System: Provide a complete telephone system for each office trailer, including, but not limited to:
 - a. Five (5) incoming telephone private lines for the field trailer. Provide one central PBX board to operate phones in trailer complex. PBX board shall be capable of operating a minimum of 20 phone stations.
- 7. Provide one (1) high speed internet connection for each trailer or equivalent. Internet connection shall have minimum recommended transmission rates of 60 - 200Mbps minimum for upload and 10Mbps for download.
- 8. Provide two (2) telephone and two (2) data outlets for each office and conference room per trailer. Data cable shall be CAT5 wiring terminating in one centralized patch panel per trailer.
- 9. Provide one each, six-button touch tone telephone desk set per desk in each office of the trailers, plus two wall-mounted six-button touch tone telephone sets in the conference area.
- 10. The telephone system shall have internal intercom capability from any station to any station.
 - a. Hold, conference, and transfer button on each telephone.
 - b. External bell with day/night switch.
 - c. Current and complete telephone directories for each station.
 - d. Digital Document Copier and Multifunction Device:
- 11. Provide the services and maintenance of a Digital copier with paper finisher in the office. The copier shall be of copying, size for size, 8 1/2" x 11", 8 1/2" x 14" and 11" x 17" copies. The copier shall have reduction/enlargement, automatic document feeding, two-sided copying, and collating features. This

device shall function as a network printer, network scanner and fax machine. Provide for copy materials in the amount of 30,000 copies per month for the term of the Contract for the copier. The copier shall be provided until final acceptance of the Contract.

Xerox Document Centre 7125T, Canon Image Runner Advance C5030, Sharp MX2610N, Ricoh MP C2504ex, HP Laser Jet Enterprise MFP M725 or approved equal. Paper drawers shall hold a ream of paper, 500 sheets. Provide Minimum of three drawers. Each drawer shall be adjustable for all paper sizes (8-1/2 x 11, 8-1/2 x 14, and 11 x 17).

12. Provide two (2) iPlanTable Workstations 46" TouchMonitor with PC IPTVS-46. Work stations shall be loaded with the latest version of Blue Beam Revu x64 Extreme and Autodesk Navisworks Freedom software.
13. Stair and Porch Material Specifications:
 - a. Framing Material: CCA pressure-treated 0.75 pounds/cubic feet minimum standard retention No. 2 Grade or better.
 - b. Framing Nails: 3 1/2 inch spiral standard hot dipped galvanized (16D).
 - c. Deck Nails: 2 1/2 inch spiral standard hot dipped galvanized (8D).
 - d. Deck Plywood: 3/4-inch tongue and grooved, CCA pressure- treated 0.75 pounds/cubic feet minimum standard retention C-D Grade or better.
 - (1) Plywood decking to be nailed minimum 8-inch center to center along floor joints.
 - (2) Concrete: 3,000 psi, minimum 5 sack mix 4-inch maximum slump. 3 to 7 percent air content.
 - (3) Corrugated Fiberglass Clear fiberglass panels Panel: non-fire retardant, 2 1/2 inches center to center x 1 1/2 inches high corrugations, 12 ounces/square foot. Heavy duty, full length sheets. No end lapping of sheets will be permitted.
 - (4) Roofing Fasteners: Neoprene Gasketed Screw Fasteners - Minimum length 2 1/2 inches. Fasteners to be hot dipped galvanized, stainless steel or aluminum. Fasteners to be installed through the high point of the corrugations, no fasteners will be allowed in the valleys. Pre-drill all holes in the roof panels.
 - (5) Flashing: All flashing shall be 60 mil minimum EPDM.

- (6) Caulking: All caulking shall be a one-part elastomeric silicone rubber-based sealant compound. All caulking shall be white in color.
- (7) Weed Barrier Fabric: Black non-woven polypropylene fabric, ultra violet light stabilized, 5.3-ounce weight. Lap all seams minimum of 6 inches.

14. Parking and Roadways

- a. CONTRACTOR shall construct a temporary aggregate parking area adjacent to the field office.

- (1) Parking should be anticipated for 26 vehicles at an average of 400 sf per vehicle, or 10,400 sf of parking and maneuvering area.
- (2) Parking area should be relatively square/rectangular with additional driveway to connect the parking to the local street. The driveway should be no more than 200 feet.
- (3) Driveway and parking area should be constructed by:
 - (a) Removing topsoil,
 - (b) Grading with less than 4% slopes,
 - (c) Grading to local stormwater collection drains,
 - (d) Compacting the subgrade,
 - (e) Installation of geotextile fabric, and
 - (f) Installation of eight (8) inches of 1 1/4-inch WisDot 305 fully compacted aggregate.

- b. Repair and maintain all parking areas, roadways, and adjacent areas for the duration of the construction contract, or as previously described.

E. Installation: Install on concrete pedestals with permanent anchoring as required by the manufacturer's installation plan.

- 1. Cover all areas directly beneath the office trailer area with weed barrier fabric and minimum of 4 inches of gravel prior to locating, leveling, and anchoring the trailer.
- 2. Site Preparation:

- a. Location of the trailer will be as shown in a layout to be provided by the OWNER prior to the Notice to Proceed. The location of the site will be at a City of Waukesha owned property near Les Paul Parkway and E Broadway at TaxKey WAKC1300986.
- b. CONTRACTOR should anticipate the location of the field trailer and parking to require clearing and grubbing of wooded areas of approximately 2 acres.
- c. Excavation for utilities and the installation of utilities shall be included in this work, as well as restoration of those areas.

3. Set-up:

- a. After trailer is placed on site and all buried utilities have been installed, including water supply and sanitary drain lines, level and block the trailer. Provide tie-downs per code or as directed. Make all final connections of utilities and provide the necessary metering and backflow prevention. Water meter shall be located in Field Office. Exterior exposed water lines shall be heat traced.
- b. Fully skirt trailer on all sides with aluminum matching the exterior of the trailer. Remove all trailer wheels and store on pallet under the trailer.
- c. Provide wooden porch with steps for access to each outside entrance. Use CCA pressure-treated lumber for the porch and steps. Include safety railing and boot scraper at each porch.
- d. The trailer and all electrical, utilities, sewer and water connections, heating, paving, furniture and accessories shall be set-up in full functional readiness by the CONTRACTOR within 45 days after the issue of the Notice-to-Proceed.

F. Trailer Walkway: Install new walkways on all trailers as described herein or shown on the Drawings.

- 1. Before installing the walkway, the trailers are to be leveled and the tie-down anchors tightened. Care shall be taken to ensure trailer skirting is not damaged or buckled when the trailer is leveled and anchored. Any damaged skirting will be replaced at the Contractor's expense.
- 2. Provide wooden porch with steps for access to each outside entrance. Use CCA pressure-treated lumber for the porch and steps. Include safety railing and boot scraper at each porch. Also include ADA Handicap Ramp with safety railing.

3. Maximum post spacing to be 11' - 0". Locate posts to miss all doors, windows, and HVAC units. Do not attach walkway to trailer.
 4. Provide bridging at mid-point of span for floor joists.
 5. All posts to sit on 10-inch diameter augered type footer, 42 inches below grade. The top of the footer exposed above grade shall be formed. Secure post to footer with galvanized post anchor or 1/2-inch diameter galvanized drift pin/anchor bolt.
 6. Install aluminum thresholds on all trailer doors. Threshold shall have adjustable aluminum weather strip to seal door bottoms.
- G. Trailer Steps: Install steps at all entrances of the trailer as described herein.
1. Steps to have CCA pressure-treated 2 x 12-inch treads, rise shall not exceed 7 inches.
 2. Trailer steps to be supported on CCA pressure-treated 4 x 4-inch post on 10-inch diameter augered type footers, 42 inches below grade. The top of the footer exposed above grade shall be formed. Posts to be secured to footer with galvanized post anchor or 1/2-inch diameter galvanized drift pin/anchor bolt. Do not attach steps to trailers.
 3. Trailer exit doors shall have min. 4 feet x 4 feet stoop outside each door or as shown on the Drawings.
 4. All stairs shall have a minimum 2 feet long, full stairway width area of 1-inch x 1/4-inch galvanized bar grating. The grating shall be open so mud scraped from shoes will fall below the walkway.
 5. ADA Ramp shall be minimum 4-foot-wide and have handrails and be in compliance with all ADA requirements.
- H. Trailer Fill & Grading: Install gravel mow strips around the RESIDENT PROJECT REPRESENTATIVE Field Offices.
1. In areas where paving or walkways extend up to the trailer skirt, mow strips are not required.
 2. In areas adjacent to paving or walkways that do not extend up to the trailer skirt, provide a mow strip from the trailer to the edge of the pavement or walkway.
 3. In remaining areas where no paving exists, provide a 4-foot wide mow strip.

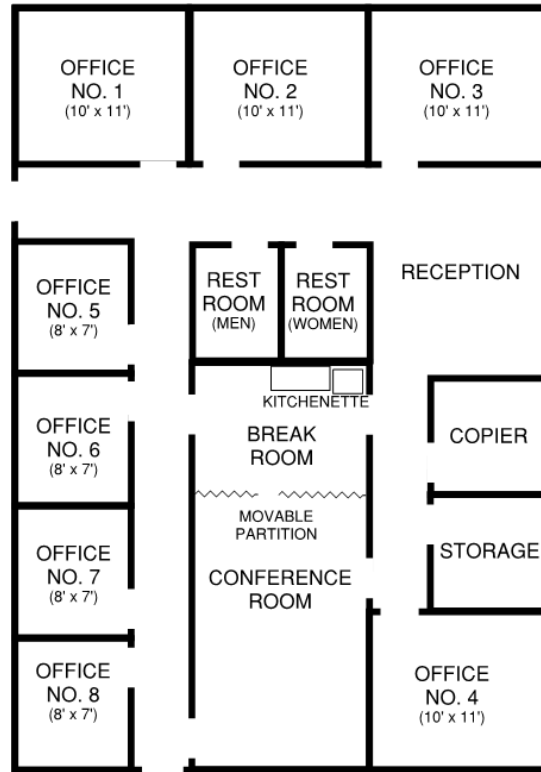
4. Mow strip shall be a minimum 4 inches thick of WisDOT Standard Specifications Section 305 aggregate.
5. The subgrade shall be graded to provide drainage away from the RESIDENT PROJECT REPRESENTATIVE'S Field Offices before any aggregate is placed.
6. A weed barrier fabric shall be placed on top of the subgrade before the 304 aggregate is placed.

RESIDENT PROJECT REPRESENTATIVE'S FIELD OFFICE
REQUIREMENTS LIST
ADDITIONAL FURNITURE

<u>QNTY.</u>	<u>ITEM DESCRIPTION</u>	<u>EQUAL TO PART NO.</u>
8	72" X 30" Folding Table	Virco Model #603072
2	66" x 30" Office Desks with Stack-on shelves with task light.*	Hon Model #P3265R, Light Gray Paint, Gray Laminate, Stack-on #38143, Task Light #870960
4	5 drawer file cabinet/letter size, with lock*	Hon Model #315P, Q Light Gray Paint
8	Conference Chairs	Hon Model #4051TAB18
4	Trash cans	Rubbermaid RCP 2956 Black
2	Wall Mounted Coat racks capable of holding 12 coats each.	-----
4	Book cases 34.5" x 71"	Hon Model S72ABC, Light Gray Paint
2	Portable plan racks with 12 clamps/rack and 24 document protectors	Safco Planhold Mobile Stand Model #5026 with Document Clamps #50056
2	12" wall clock	-----
2	Tack board (3' x 4'), framed	-----
1	50" LED Smart Screen HDTV	LG - 50" Class - LED - UK6090PUA Series - 2160p - Smart - 4K UHD TV or equal

Final Ownership: At the completion of the contract or 12 months from the Notice to Proceed, all furnishings and equipment purchased by the CONTRACTOR shall be legally transferred to a third party of the OWNER'S direction. Similarly, any

equipment rented/leased by the CONTRACTOR shall be legally transferred to a third party of the OWNER'S direction.



Typical Field Office Configuration

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 60 00
MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description
- B. Substitutions
- C. Manufacturer's Written Instructions
- D. Transportation and Handling
- E. Storage, Protection and Maintenance
- F. Manufacturer's Field Quality Control Services
- G. Post Startup Services
- H. Special Tools and Lubricating Equipment
- I. Lubrication
- J. Related Work Specified In Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 33 00 – Submittals
 - 3. Section 01 45 00 – Quality Control
 - 4. Section 01 50 00 - Construction Facilities and Temporary Controls
 - 5. Section 01 79 00 - Training

1.2 DESCRIPTION

- A. Proposed Manufacturers List: Within 15 calendar days of the date of the Notice to Proceed, submit to the ENGINEER and RESIDENT PROJECT REPRESENTATIVE a list of the names of proposed manufacturers, material men, suppliers and subcontractors, obtain approval of this list by OWNER prior to submission of any shop drawings. Upon request submit evidence to ENGINEER that each proposed manufacturer has manufactured a similar product to the one specified and that it has previously been used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.

B. Furnish and install Material and Equipment which meets the following:

1. Conforms to applicable specifications and standards.
2. Complies with size, make, type, and quality specified or as specifically approved, in writing, by ENGINEER.
3. Will fit into the space provided with sufficient room for operation and maintenance access and for properly connecting piping, ducts and services, as applicable. Make the clear spaces that will be available for operation and maintenance access and connections equal to or greater than the manufacturers' requirements. Make provisions for installing equipment furnished.
4. Manufactured and fabricated in accordance with the following:
 - a. Design, fabricate, and assemble in accordance with best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Provide two or more items of same kind identical, by same manufacturer.
 - d. Provide materials and equipment suitable for service conditions.
 - e. Adhere to equipment capabilities, sizes, and dimensions shown or specified unless variations are specifically approved in writing.
 - f. Adapt equipment to best economy in power consumption and maintenance. Proportion parts and components for stresses that may occur during continuous or intermittent operation, and for any additional stresses that may occur during fabrication or installation.
 - g. Working parts are readily accessible for inspection and repair, easily duplicated and replaced.
5. Use material or equipment only for the purpose for which it is designed or specified.

1.3 SUBSTITUTIONS

A. Substitutions:

1. CONTRACTOR's requests for changes in equipment and materials from those required by the Contract Documents are considered requests for

substitutions and are subject to CONTRACTOR's representations and review provisions of the Contract Documents when one of following conditions are satisfied:

- a. Where request is directly related to an "or equal" clause or other language of same effect in Specifications.
- b. Where required equipment or material cannot be provided within Contract Time, but not as result of CONTRACTOR's failure to pursue Work promptly or to coordinate various activities properly.
- c. Where required equipment or material cannot be provided in manner compatible with other materials of Work, or cannot be properly coordinated therewith.
- d. In the event a substitution is approved, the OWNER will require from the CONTRACTOR a credited deduction from the Contract amount equal to any savings in material cost resulting from use of the proposed substitute.

2. CONTRACTOR's Options:

- a. Where more than one choice is available as options for CONTRACTOR's selection of equipment or material, select option compatible with other equipment and materials already selected (which may have been from among options for other equipment and materials).
- b. Where compliance with specified standard, code or regulation is required, select from among products which comply with requirements of those standards, codes, and regulations.
- c. "Or Equal": For equipment or materials specified by naming one or more equipment manufacturer and "or equal", submit request for substitution for any equipment or manufacturer not specifically named.

B. Conditions Which are Not Substitution:

1. Requirements for substitutions do not apply to CONTRACTOR options on materials and equipment provided for in the Specifications.
2. Revisions to Contract Documents, where requested by OWNER or ENGINEER, are "changes" not "substitutions".
3. CONTRACTOR's determination of and compliance with governing regulations and orders issued by governing authorities do not constitute

substitutions and do not constitute basis for a Change Order, except as provided for in Contract Documents.

1.4 MANUFACTURER'S WRITTEN INSTRUCTIONS

- A. Instruction Distribution: When the Contract Documents require that installation, storage, maintenance and handling of equipment and materials comply with manufacturer's written instructions, obtain and distribute printed copies of such instructions to parties involved in installation, including copies to ENGINEER. Provide copies to ENGINEER in accordance with Section 01 33 00.
 - 1. Maintain one set of complete instructions at jobsite during storage and installation, and until completion of work.
- B. Manufacturer's Requirements: Store, maintain, handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's written instructions and in conformity with Specifications.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult RESIDENT PROJECT REPRESENTATIVE for further instructions. Do not proceed with corresponding work without written instructions.
- C. Performance Procedures: Perform work in accordance with manufacturer's written instructions. Do not omit preparatory steps or installation procedures, unless specifically modified or exempted by Contract Documents.

1.5 TRANSPORTATION AND HANDLING

- A. Coordination with Schedule: Arrange deliveries of materials and equipment in accordance with Construction Progress Schedules. Coordinate to avoid conflict with work and conditions at site.
 - 1. Deliver materials and equipment in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Protect bright machined surfaces, such as shafts and valve faces, with a heavy coat of grease prior to shipment.
 - 3. Immediately upon delivery, inspect shipments to determine compliance with requirements of Contract Documents and approved submittals and that material and equipment are protected and undamaged.
- B. Handling: Provide equipment and personnel to handle material and equipment by methods recommended by manufacturer to prevent soiling or damage to materials and equipment or packaging.

1.6 STORAGE, PROTECTION, AND MAINTENANCE

A. On-site storage areas and buildings:

1. Conform storage buildings to requirements of Section 01 50 00.
2. Coordinate location of storage areas with RESIDENT PROJECT REPRESENTATIVE and OWNER.
3. Arrange on site storage areas for proper protection and segregation of stored materials and equipment with proper drainage. Provide for safe travel around storage areas and safe access to stored materials and equipment.
4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
5. Store materials such as pipe, reinforcing and structural steel, and equipment on pallets, blocks or racks, off ground.
6. Store fabricated materials and equipment above ground, on blocking or skids, to prevent soiling or staining. Cover materials and equipment which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

B. Interior Storage:

1. Store materials and equipment in accordance with manufacturer's instructions, with seals and labels intact and legible.
2. Store materials and equipment, subject to damage by elements, in weathertight enclosures.
3. Maintain temperature and humidity within ranges required by manufacturer's instructions.

C. Accessible Storage: Arrange storage in a manner to provide easy access for inspection and inventory. Make periodic inspections of stored materials or equipment to assure that materials or equipment are maintained under specified conditions and free from damage or deterioration.

1. Perform maintenance on stored materials of equipment in accordance with manufacturer's instructions, in presence of OWNER or RESIDENT PROJECT REPRESENTATIVE.
2. Submit a report of completed maintenance to RESIDENT PROJECT REPRESENTATIVE with each Application for Payment.

3. Failure to perform maintenance, to notify RESIDENT PROJECT REPRESENTATIVE of intent to perform maintenance or to submit maintenance report may result in rejection of material or equipment.
- D. OWNER's Responsibility: OWNER has no responsibility for materials or equipment stored in buildings or on-site. CONTRACTOR assumes full responsibility for damage due to storage of materials or equipment.
- E. CONTRACTOR's Responsibility: CONTRACTOR has full responsibility for protection of completed construction. Repair and restore damage to completed Work equal to its original condition.
- F. Special Equipment: Use only rubber tired wheelbarrows, buggies, trucks, or dollies to wheel loads over finished floors, regardless if the floor has been protected or not. This applies to finished floors and to exposed concrete floors as well as those covered with composition tile or other applied surfacing.
- G. Surface Damage: Where structural concrete is the finished surface, take care to avoid marking or damaging surface.

1.7 MANUFACTURER'S FIELD QUALITY CONTROL SERVICES

- A. General:
 1. Provide manufacturer's field services in accordance with this subsection for those tasks specified in other sections.
 2. Provide training as specified in Section 01 79 00.
 3. Include and pay all costs for suppliers' and manufacturers' services, including, but not limited to, those specified.
- B. Installation Instruction: Provide instruction by competent and experienced technical representatives of equipment manufacturers or system suppliers as necessary to resolve assembly or installation procedures which are attributable to, or associated with, the equipment furnished.
- C. Installation Inspection, Adjustments and Startup Participation:
 1. Provide competent and experienced technical representatives of equipment manufacturers or system suppliers to inspect the completed installation as follows.
 - a. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions which may cause damage.

- b. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
 - c. Verify that wiring and support components for equipment are complete.
 - d. Verify that equipment or system is installed in accordance with the manufacturer's recommendations, approved shop drawings and the Contract Documents.
 - e. Verify that nothing in the installation voids any warranty.
- 2. Provide manufacturer's representatives to perform initial equipment and system adjustment and calibration conforming to the manufacturer's recommendations and instructions, approved shop drawings and the Contract Documents.
 - 3. Obtain RESIDENT PROJECT REPRESENTATIVE's approval before start-up of equipment. Execute start-up under supervision of applicable manufacturer's representative in accordance with manufacturers' instructions.
 - 4. Furnish RESIDENT PROJECT REPRESENTATIVE with copies of the following in the format and quantity specified in Section 01 33 00. When training is specified, furnish the copies at least 24 hours prior to training.
 - a. "Certificate of Installation, Inspection and Start-up Services" by manufacturers' representatives for each piece of equipment and each system specified, certifying:
 - (1) That equipment is installed in accordance with the manufacturers' recommendations, approved shop drawings and the Contract Documents.
 - (2) That nothing in the installation voids any warranty.
 - (3) That equipment has been operated in the presence of the manufacturer's representative.
 - (4) That equipment, as installed, is ready to be operated by others.
 - b. Detailed report by manufacturers' representatives, for review by RESIDENT PROJECT REPRESENTATIVE of the installation, inspection and start-up services performed, including:

- (1) Description of calibration and adjustments if made; if not in Operation and Maintenance Manuals, attach copy.
 - (2) Description of any parts replaced and why replaced.
 - (3) Type, brand name, and quantity of lubrication used, if any.
 - (4) General condition of equipment.
 - (5) Description of problems encountered, and corrective action taken.
 - (6) Any special instructions left with CONTRACTOR or RESIDENT PROJECT REPRESENTATIVE.
- D. Field Test Participation: Provide competent and experienced technical representatives of all equipment manufacturers and system suppliers as necessary to participate in field testing of the equipment specified in Section 01 45 00.
- E. Trouble-Free Operation: Provide competent and experienced technical representatives of all equipment manufacturers and system suppliers as necessary to place the equipment in trouble-free operation after completion of start-up and field tests.

1.8 SPECIAL TOOLS AND LUBRICATING EQUIPMENT

- A. General: Furnish, per manufacturer's recommendations, special tools required for checking, testing, parts replacement, and maintenance. (Special tools are those which have been specially designed or adapted for use on parts of the equipment, and which are not customarily and routinely carried by maintenance mechanics.)
- B. Time of Delivery: Deliver special tools and lubricating equipment to OWNER when unit is placed into operation and after operating personnel have been properly instructed in operation, repair, and maintenance of equipment.
- C. Quality: Provide tools and lubricating equipment of a quality meeting equipment manufacturer's requirements.

1.9 LUBRICATION

- A. General: Where lubrication is required for proper operation of equipment, incorporate in the equipment the necessary and proper provisions in accordance with manufacturer's requirements. Where possible, make lubrication automated and positive.
- B. Oil Reservoirs: Where oil is used, supply reservoir of sufficient capacity to lubricate unit for a minimum 24-hour period.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

CERTIFICATE OF INSTALLATION, INSPECTION AND START-UP SERVICES

Project _____

Equipment _____

Specification Section _____

Contract _____

I hereby certify that the named equipment has been inspected, adjusted and operated by the Manufacturers' Representative and further certify:

1. That the equipment is installed in accordance with the manufacturer's recommendations, approved shop drawings and the Contract Documents.
2. That nothing in the installation voids any warranty.
3. That equipment has been operated in the presence of the manufacturer's representative.
4. That equipment, as installed, is ready to be operated by others.

MANUFACTURERS' REPRESENTATIVE

Signature _____ Date _____

Name (print) _____

Title _____

Representing _____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title _____

Attach the detailed report called for by Specification Section 01 60 00. If not attached, explain why in the following space:

Complete and submit three copies of this form with the detailed report to RESIDENT PROJECT REPRESENTATIVE as specified.

SECTION 01 71 23
LINES AND GRADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General
- B. Surveys
- C. Datum Plane
- D. Protection of Survey Data
- E. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 01 78 00 - Contract Close Out
 - 2. Section 33 05 53 - Buried High Density Polyethylene Pipe and Fittings
 - 3. Section 33 05 55 - Buried Ductile Iron Pipe and Fittings

1.2 GENERAL

- A. Construct Work in accordance with the lines and grades shown. Assume full responsibility for keeping alignment and grade.

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings:
 - 1. Alignment survey signed and sealed by a land surveyor registered in the State of Wisconsin as specified in Sections 33 05 53 and 33 05 55.
- C. Quality Control:
 - 1. Field survey data of located pipe, utilities, appurtenances, pavement and structures signed and sealed by the land surveyor registered in the State of Wisconsin, as specified in Section 01 78 00.

1.4 SURVEYS

- A. Control Points: Base horizontal and vertical control points will be established or designated by the RESIDENT PROJECT REPRESENTATIVE and used as datum for the Work. Perform additional survey, layout, and measurement work as specified.
1. Keep RESIDENT PROJECT REPRESENTATIVE informed, sufficiently in advance, of the times and places at which work is to be performed so that base horizontal and vertical control points may be established and any checking deemed necessary by RESIDENT PROJECT REPRESENTATIVE may be done, with minimum inconvenience to the RESIDENT PROJECT REPRESENTATIVE and at no delay to CONTRACTOR. It is the intention not to impede the Work for the establishment of control points and the checking of lines and grades set by the CONTRACTOR. However, when necessary, suspend working operations for such reasonable time as the RESIDENT PROJECT REPRESENTATIVE may require for this purpose. Costs associated with such suspension are deemed to be included in the Contract Price, and no time extension or additional costs will be allowed.
 2. Provide an experienced survey crew including an instrument operator, competent assistants, and any instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement of work performed by the CONTRACTOR.
- B. Alignment Survey and Laying Schedule
1. Employ the services of a land surveyor, registered in the State of Wisconsin, to survey the centerline alignment of the proposed pipeline. Field verify the size, type of pipe joints, station, offset and elevation of each proposed tie-in location to existing infrastructure or proposed Work done or to be done by others. Survey at a minimum of one location upstream and one location downstream of the proposed tie-in location. Note in the survey horizontal points of intersection and deflection angles with their respective field stations. Reference the alignment survey to the survey line shown. Note existing ground surface elevations over the centerline of the new pipeline in the survey, with respective field stations, at 100-foot intervals.
 - a. In the event of discrepancies between the centerline stationing shown and that obtained by actual field survey, notify the RESIDENT PROJECT REPRESENTATIVE and the ENGINEER. The ENGINEER will advise the CONTRACTOR of any appropriate adjustments in alignment.
 2. Upon completion of the alignment survey, furnish the survey, along with the CONTRACTOR's proposed installation sequence, in electronic format to the ENGINEER, RESIDENT PROJECT REPRESENTATIVE, and pipe

material supplier. Coordinate with the pipe material supplier in developing a pipe laying schedule based on the alignment survey, vertical alignment shown and CONTRACTOR's installation sequence. Completely define the horizontal and vertical centerline alignment of the pipeline, as well as every piece of pipe, fitting, closure, bend and appurtenance to be employed in its construction in a tabular laying schedule. Layout drawings are not an acceptable substitute for the laying schedule. Assume responsibility for the accuracy of the laying schedule and for the complete and correct construction of the pipeline in place as shown, specified and directed, and for observing the need for and making any changes in the arrangement of piping, connections, wiring, manner of installation, and other items which may be required by the materials and equipment proposed to supply both as pertains to the Work and any Work affected under other parts, headings, or divisions of the Contract Documents. Assume responsibility for misfits due to errors in submittals.

3. Require CONTRACTOR's land surveyor to establish construction centerline offset hubs at 50- to 100-foot intervals as directed by the RESIDENT PROJECT REPRESENTATIVE. Protect these hubs from displacement or damage during construction. Reset any offset hubs damaged or displaced by the land surveyor.

C. Surveys for Record Drawings

1. Obtain and furnish to the ENGINEER and RESIDENT PROJECT REPRESENTATIVE surveys of the locations and elevations of pipe constructed for this Project for the ENGINEER's use in developing record drawings as specified in Section 01 78 00. Accomplish survey work by a land surveyor registered in the State of Wisconsin.

1.5 DATUM PLANE

- A. Elevations indicated or specified refer to the following datum and are expressed in feet and decimal parts thereof, or in feet and inches:
 1. Horizontal: Wisconsin State Plane Coordinate System, South Zone, NAD27
 2. Vertical: National Geodetic Vertical Datum of 1929 (NGVD29)

1.6 PROTECTION OF SURVEY DATA

- A. General: Safeguard points, stakes, grade marks, known property corners, monuments, and bench marks made or established for the Work, including protection of marks provided by utilities or private companies. Reestablish them if disturbed, and bear the expense of checking reestablished marks and rectifying work improperly installed.

- B. Records: Keep neat and legible notes of measurements and calculations made in connection with the layout of the Work. Furnish such data to the RESIDENT PROJECT REPRESENTATIVE for use in checking the CONTRACTOR's layout. Data considered of value to the OWNER will be transmitted to the OWNER by the RESIDENT PROJECT REPRESENTATIVE with other records on completion of the Work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below.
1. Global Navigation Satellite System Receiver: Equivalent products may not be submitted.
 - a. Trimble R8s, Model 60 with Double Receiver Transport Case

2.2 MATERIALS

- A. Global Navigation Satellite System Receiver:
1. Furnish one receiver for use by the RESIDENT PROJECT REPRESENTATIVE supporting USB, Wi-Fi and Bluetooth; L1/L2 (GPS, GLONASS, Galileo, BeiDou, QZSS), MSS (RTX), L1 SBAS; 1 cm real time accuracy (RTK Positioning) that is iOS, Android, Windows, and Bluetooth compatible. Furnish receiver with Lband antenna, antenna mounting plate, antenna cable 0.1m RSMA(M) / BNC(F), pole bracket, pole clamp, battery pack, battery charger, 100-240V, 6 feet USB cable, Anatum's custom hard shell case, 2-meter carbon fiber fixed-height range pole, 2-year warranty (90-day battery warranty), and RTK base/rover activation.
 2. Furnish Trimble R2 Receiver and accessories as noted below:
 - a. R2-101-00 Trimble R2 single receiver
 - b. R2-CFG-001-43 Trimble R2 Configuration Level - Centimeter mode
 - c. 106170-00 Trimble R2 Accessory - Transport Case (Single Receiver)
 - d. 101071-00-01 Trimble Geospatial Acc'y - Power Supply and Power Cord for Dual Battery Charger

- | | | |
|----|---------------------------|---|
| e. | EWLS-R2-FW-STOCK | TPP - Firmware Maintenance - Trimble R2 (36 month expiration) |
| f. | EWLS-R2-STOCK | TPP - Hardware - Trimble R2 (36 month expiration) |
| g. | 43169-20 | Rod - 2.5m Carbon Fiber Telescopic Range Pole with Bipod |
| h. | 5200-24-050 | X-GRIP 2 for 7" Tablets |
| i. | 5200-201 | Arm, Double Socket, 1" |
| j. | 5200-160 | Pole Clamp, Ball, 1¼", Claw |
| k. | Apple iPad Mini (5th Gen) | Space Grey, 265GB, Wi-Fi Only |
| l. | IPDM-E-BK-BBY | Urban Armor Gear - Metropolis Folio Case for Apple® iPad® mini |
| m. | ZD-TG-A-IPM-7.9-19 | SaharaCase - ZeroDamage Tempered Glass Screen Protector for Apple iPad mini |

3. Upon completion of the Work, the RESIDENT PROJECT REPRESENTATIVE will furnish the receiver and accessories to the OWNER and the receiver and accessories will hereafter become the property of the OWNER.

PART 3 EXECUTION

Not Used

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General Requirements
- B. Scheduling of Shutdown

1.2 RELATED SECTIONS

Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:

- 1. Section 01 11 00 - Summary of Work

1.3 GENERAL REQUIREMENTS

- A. Coordination: Perform all cutting, fitting or patching of the Work that may be required to make the several parts thereof join in accordance with the Contract Documents. Perform restoration with competent workmen skilled in the trade.
- B. Improperly Timed Work: Perform all cutting and patching required to install improperly timed work, to remove samples of installed materials for testing, and to provide for alteration of existing facilities or for the installation of new Work in the existing construction.
- C. Limitations: Except when the cutting or removal of existing construction is specified or indicated, do not undertake any cutting or demolition which may affect the structural stability of the Work or existing facilities without the RESIDENT PROJECT REPRESENTATIVE's concurrence.

1.4 SCHEDULING OF SHUTDOWN

- A. Connections to Existing Facilities: If any connections, replacement, or other work requiring the shutdown of an existing facility is necessary, schedule such work at times when the impact on the City of Waukesha's Clean Water Plant, and property owners' normal operation and the public's use of the site is minimal. Overtime, night and weekend work without additional compensation from the OWNER, may be required to make these connections, especially if the connections are made at times other than those specified.

- B. Request for Shutdowns: Submit a written request for each shutdown to the OWNER and the RESIDENT PROJECT REPRESENTATIVE sufficiently in advance of any required shutdown.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PREPARATION

- A. Safeguards: Provide all shoring, bracing, supports, and protective devices necessary to safeguard all work and existing facilities during cutting and patching operations.
- B. Location of Embedments: Employ impulse radar (non x-ray type) nondestructive testing prior to core drilling or cutting of existing walls, floors and ceilings to identify location of embedded pipes or conduits.
- C. Material Removal: Cut and remove all materials to the extent shown or as required to complete the Work. Remove materials in a careful manner with no damage to adjacent facilities. Remove materials which are not salvageable from the site.

3.2 RESTORATION

- A. Final Appearance and Finish: Restore all work and existing facilities affected by cutting operations, with new materials, or with salvaged materials acceptable to the RESIDENT PROJECT REPRESENTATIVE, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, patch and refinish entire surfaces.

END OF SECTION

SECTION 01 74 00

CLEANING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Final Cleaning
- B. Final Inspection

1.2 FINAL CLEANING

- A. Requirements: At the completion of work and immediately prior to final inspection, clean the project as follows:
 - 1. Thoroughly clean, sweep, wash, and polish work and equipment provided under the Contract, including finishes. Leave the structures and site in a complete and finished condition.
 - 2. Direct subcontractors to similarly perform, at the same time, an equivalent thorough cleaning of work and equipment provided under their contracts.
 - 3. Remove temporary structures and all debris, including dirt, sand, gravel, rubbish and waste material.
 - 4. Should the CONTRACTOR not remove rubbish or debris or not clean the vaults and site as specified above, the OWNER reserves the right to have the cleaning done at the expense of the CONTRACTOR.
- B. Employ experienced workers, or professional cleaners, for final cleaning.
- C. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- D. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- E. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces. Polish surfaces so designated to shine finish.
- F. Repair, patch, and touch up marred surfaces to specified finish, to match adjacent surfaces.

- G. Remove snow and ice from access to vaults.
- H. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.
- I. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly-painted surfaces.
- J. Wash and wipe clean all lighting fixtures, lamps, and other electrical equipment which may have become soiled during installation.
- K. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- L. Remove erection plant, tools, temporary structures and other materials.
- M. Remove and dispose of all water, dirt, rubbish or any other foreign substances.

1.3 FINAL INSPECTION

- A. After cleaning is complete the final inspection may be scheduled. The inspection will be done with the OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 78 00
CONTRACT CLOSE OUT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Record Drawings
- B. Survey Data
- C. Special Tools

1.2 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Quality Control:
 - 1. Make available field books, notes, and other data developed or obtained in performing the surveys required by the Work to the RESIDENT PROJECT REPRESENTATIVE for examination throughout the construction period.
 - 2. At completion of the Contract and as a prerequisite for final payment:
 - a. Furnish field books, notes, and other data developed or obtained in performing the surveys required by the Work.
 - b. Furnish clearly readable, reproducible Contract Drawings reflecting changes made during construction. Mark each drawing "Record Drawing" in ink.
 - c. Deliver to the OWNER the original and one copy of bonds, warranties, guarantees and similar documents, including those customarily provided by manufacturers and suppliers which cover a period greater than the one year correction period. Show OWNER as beneficiary of these documents.
- C. Operation and Maintenance:
 - 1. For each type of equipment provided under this Contract, furnish a complete set of special tools and grease guns and other lubricating devices, which may be needed for the adjustment, operation, maintenance, and disassembly of such equipment. Special tools are considered to be those tools which, because of their limited use, are not normally available but which are

necessary for maintenance of particular equipment. Furnish only tools of high grade, smooth forged alloy tool steel. Manufacture grease guns of the lever type.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 RECORD DRAWINGS

- A. Maintain on-site, in good order, one record copy of original Contract Documents, Specifications, and any other documents related to the project. Using drafting symbols and standards consistent with the original documents, annotate Contract Drawings to show changes made during the construction period.

1. Annotate the following items at a minimum:

- a. Horizontal and vertical deviations of pipe, ends of steel casings, ends of HDPE pipe segments, valve nuts, valve centerlines, precast vaults, including rim and invert, concrete encasements, and cathodic protection test station as follows:

(1) Horizontal:

- (a) More than 1-foot or one-half the diameter of the pipe, as applicable, whichever is less.

(2) Vertical:

- (a) More than 0.5-feet for pressure pipe systems.
(b) More than 0.1-feet for gravity pipe systems.

b. Deviations of existing utilities as follows:

- (1) Top of pipe elevation, if deviation exceeds the horizontal and vertical deviation requirements of this Section, size, material, and type of utilities encountered in excavations. Locate by station/offset.
(2) Catch basins, manholes, and other structures that were encountered in excavations if deviation exceeds the horizontal and vertical deviation requirements of this Section. Locate by

station/offset. Annotate invert elevations for pipes at these structures.

- c. Size, material, depth, location, and limits of any abandoned pipe. Include type of abandonment. Locate by station/offset.
- d. Limits, dimensions, and depth of concrete encasements.
- e. At Horizontal Directional Drilling (HDD) Segments:
 - (1) A plan view showing the centerline location of each pipe installed via HDD, or installed and placed out of service. Show the remainder of the horizontal alignment of the centerline of each pipe installed via HDD, or installed and placed out of service, and note the accuracy of with which the installation was monitored.
 - (2) A profile drawing for each bore path showing the ground or pavement surface and the crown elevation of each pipe installed via HDD, or installed and placed out of service. Show the remainder of the vertical alignment of the crown of each pipe installed via HDD, or installed and placed out of service, and note the accuracy with which the installation was monitored. If the profile drawing for the bore path is not made on a copy of the Contract Drawing profile, use 10 to 1 vertical exaggeration.
 - (3) If the bore path is abandoned without installing the high density polyethylene (HDPE) pipe, show the abandoned bore path on the Record Drawings and callout as "Abandoned Bore Path." Show the location and the length of the drill head and any items not removed from the bore path.
- f. EMS Markers.

- 2. Annotate deviations using a "cloud". If changes require a change order, annotate the change order number in the "cloud".
- 3. Annotated drawings are to be made available to RESIDENT PROJECT REPRESENTATIVE for reference at all times.

3.2 SURVEY DATA

- A. Survey coordinates and elevations to within 0.01 feet for field located pipe, utilities, appurtenances, pavement and structures by a land surveyor registered in the State of Wisconsin. Horizontal coordinates to be in North American Datum of 1927 (NAD27) Wisconsin State Plane Coordinate System, South Zone, in U.S.

Survey Feet. The vertical datum to be National Geodetic Vertical Datum of 1929 (NGVD29). Field locate constructed elements, including:

1. Top of pipe every 50 feet along pipeline
2. Gate and butterfly valves:
 - a. Valve nuts
 - b. Valve centerline
 - c. Valve pads
3. Top of air valve vent riser pipes
4. Precast vaults:
 - a. Rim
 - b. Invert
 - c. Top of pipe
5. Fittings, plugs, caps, flange insulating kits, and special joints
6. Taps for disinfection and testing, as applicable
7. Blow-off assemblies:
 - a. Connection to pipeline
 - b. Blow-off outlet
8. Cathodic protection:
 - a. Galvanic magnesium anodes
 - b. Test stations
9. Tracer wire test stations
10. Concrete encasements
11. Ends of steel casings
12. Ends of HDPE pipe segments

13. Other public and private utilities encountered during construction that cross over or under the new pipe
14. Roadways, sidewalks, and trails:
 - a. Roadway section (edge of pavement – crown – edge of pavement) at each storm drainage structure
 - b. Roadway section (edge of pavement – crown – edge of pavement) 200-feet minimum between sections
15. Curb and gutter at intervals of 50 feet where the new curb and gutter are installed.

B. Deliverable

1. Create unique As-Built Record Survey Point comma-separated values (CSV) Point Files for each pipeline for each monthly submittal.
2. CSV files shall provide accurate state plane coordinates and elevation data for all items listed in Part A for which Monthly Progress Payment is being requested.
3. The Record Survey Point CSV files are required to be submitted along with the payment request. Failure to provide the CSV files will result in a denial of Monthly Progress Payment Application.
4. No previous month's as-built record survey points shall be included on the newly generated file.

C. CSV File Naming Format

1. CVS File name shall be formatted using the pipeline identifier, the beginning of pipe station, the date the file is issued.
 - a. Pipeline Identifier:
 - (1) RF = Return Flow Pipeline
 - (2) BD = BPS Discharge Pipeline
 - (3) WS = Water Supply Pipeline
 - (4) SU = Station Suction Pipeline
 - (5) FS = Franklin Sewer
 - b. Beginning of Pipe Station:
 - (1) 0000 = Return Flow Pipeline Part 1 CP5
 - (2) 1000 = Return Flow Pipeline CP2B

- (3) 2000 = Return Flow Pipeline Part 2 CP5
- (4) 3000 = Return Flow Pipeline CP6
- (5) 4000 = BPS Discharge Pipeline CP2B
- (6) 5000 = Water Supply Pipeline CP2A
- (7) 6000 = Station Suction Pipeline 1 CP2A
- (8) 7000 = Station Suction Pipeline 2 CP2A
- (9) 8000 = Water Supply Pipeline CP2B
- (10) 0000 = 18" Sanitary Sewer CP6

c. Date in the format of YYYY_MM_DD

d. Examples:

- (1) RF-0000-2020_01_01012020.CSV
- (2) RF-1000-2020_01_01.CSV
- (3) RF-2000-2020_01_01.CSV
- (4) RF-3000-2020_01_01.CSV
- (5) BD-4000-2020_01_01.CSV
- (6) WS-5000-2020_01_01.CSV
- (7) SU-6000-2020_01_01.CSV
- (8) SU-7000-2020_01_01.CSV
- (9) WS-8000-2020_01_01.CSV
- (10) FS-0000-2020_01_01.CSV

D. Data Point Description

- 1. Data points shall be given a five-digit, sequential point number.
- 2. Use the following field codes as the basis for naming each CVS point: Tag Number, Pipeline Identifier, Object Identifier, Size, and Material.

a. Tag Number:

- (1) NT = No Tag Number
- (2) AV = Air Valve (numerical tag value)
- (3) BO = Blow-Off Assembly (numerical tag value)
- (4) V = Isolation Valve (numerical tag value)

b. Pipeline Identifier:

- (1) RF = Return Flow Pipeline
- (2) BD = BPS Discharge Pipeline
- (3) WS = Water Supply Pipeline

c. Object Identifier:

- (1) ATS = Anode Test Station

- (2) B11.25 = 11.25 Degree Bend
- (3) B22.5 = 22.5 Degree Bend
- (4) B30 = 30 Degree Bend
- (5) B45 = 45 Degree Bend
- (6) B60 = 60 Degree Bend
- (7) B90 = 90 Degree Bend
- (8) BFV = Butterfly Valve
- (9) BOC = Back of Curb
- (10) BOO = Blow-Off Outlet
- (11) CAP = Pipeline Cap
- (12) CE = Concrete Encasement
- (13) EOP = Edge of Pavement
- (14) ECI = Electrical Current Isolation
- (15) FOS = Fiber Optic Splice Box
- (16) GV = Gate Valve
- (17) GWB = Ground Water Barrier
- (18) MGA = Magnesium Anode
- (19) MHC = Manhole Cover
- (20) MHI = Manhole Invert
- (21) PC = Pipe Closure
- (22) PLG = Plug
- (23) RCL = Road Center Line
- (24) RED = Reducer
- (25) REOP = Road Edge of Pavement
- (26) STMI = Storm Inlet
- (27) STMMH = Storm Manhole
- (28) TCP = Top of Casing Pipe
- (29) TEE = Tee
- (30) TOP = Top of Pipe
- (31) TWB = Tracer Wire Box
- (32) UC = Utility Crossing
- (33) VB = Valve Box
- (34) VN = Valve Nut
- (35) VNT = Vent
- (36) VP = Valve Pad
- (37) WYE = Wye Fitting

d. Size:

- (1) 0.5 = one-half inch
- (2) 1 = 1 inch
- (3) 1.5 = 1.5 inch
- (4) 2 = 2 inch
- (5) 4 = 4 inch
- (6) 6 = 6 inch
- (7) 8 = 8 inch
- (8) 12 = 12 inch

- (9) 18 = 18 inch
- (10) 24 = 24 inch
- (11) 30 = 30 inch
- (12) 36 = 36 inch
- (13) 42 = 42 inch
- (14) 48 = 48 inch
- (15) 54 = 54 inch
- (16) 24X30 = 24 inch by 30 inch
- (17) 30X8 = 30 inch by 8 inch
- (18) 30X36 = 30 inch by 36 inch
- (19) 36X8 = 36 inch by 8 inch
- (20) Similar for other sizes

e. Material:

- (1) DI = Ductile Iron
- (2) HDPE = High Density Polyethylene
- (3) PVC = Polyvinyl Chloride
- (4) CI = Cast Iron
- (5) STL = Steel
- (6) SSTL = Stainless Steel
- (7) FRP = Fiberglass
- (8) RC = Reinforced Concrete

f. Format Notes:

- (1) All capital letters
- (2) Add "NT" where no tag numbers are available
- (3) Dashes between each item
- (4) No spaces between letters, numbers, or dashes
- (5) No inch symbol ("") after size
- (6) Do not use No "XX" or "—"
- (7) No commas, semi-colons, or backslashes
- (8) Use periods only when indicating size to the fraction of an inch

g. Examples:

- (1) AV-WS01-MHI = Air Valve 01 on WSPL, Manhole Invert
- (2) NT-RF-B45-30-DI = RFPL 45 Degree Bend, 30" Ductile Iron
- (3) NT-RF-RED-24x30-DI = RFPL Reducer, 24"x30" Ductile Iron
- (4) NT-WS-TCAS-54-STL = WSPL Casing, 54" Steel
- (5) V-BD-BFV-36 = BPS Discharge Pipeline Valve 2, Top of Butterfly Valve, 36"

E. CSV Data Point Information Table

1. Provide information for the Record Survey Point CSV File that matches the following example:

	Northing (N)	Easting (E)	Elevation (Z)	Description (D)
	359025.84	2491611.32	781.25	NT-RF-TOP-30-DI
	359036.18	2491611.32	782.12	NT-RF-TOP-30-DI
	359088.12	2491618.54	790.50	AV01-RF-MHC
	359088.12	2491622.64	788.30	AV01-RF-VNT-8-SSTL
	359094.74	2491624.84	744.27	NT-RF-TWB

F. Delivery Method

1. All monthly CSV files are to be uploaded to the Project Share Folder.
2. All submitted information is provided for review by the RESIDENT PROJECT REPRESENTATIVE and ENGINEER. If submitted information is found to be incomplete by the RESIDENT PROJECT REPRESENTATIVE or ENGINEER, a response listing the items that are incomplete will be submitted back to the Contractor within 5 working days for correction. Corrections are required to be resolved prior to the next pay application submittal.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 78 23

OPERATION AND MAINTENANCE MANUALS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Scope: Furnish to the ENGINEER two hardcopies, one electronic version on USB flash drive in PDF format of an Operation and Maintenance Manual for all equipment and associated control systems furnished and installed.

1.2 SUBMITTALS

- A. Prior to the Work Reaching 50 Percent Completion, submit to the ENGINEER for approval one electronic copy on USB flash drive of the manual in PDF format with all specified material. Submit the approval copies with the partial payment request for the specified completion. Provide space in the manual for additional material. Submit any missing material for the manual prior to requesting certification of substantial completion.
- B. Provide one copy of the final CONTRACTOR's Operation and Maintenance manual electronically on USB flash drive complete after the submission of any missing material prior to requesting certification of substantial completion. CONTRACTOR will ensure that all material required for a complete CONTRACTOR's Operation and Maintenance Manual. The electronic version of the final manual will be submitted in the latest PDF file format and follow the same contents, organization, and formatting as the final hardcopies of the manual. Provide two hard copies of the final CONTRACTOR's Operation and Maintenance manual, and one electronic version of USB flash drive. Provide the hard copies only after completion of equipment startup and training.

1.3 FORMAT AND CONTENTS

- A. Prepare and arrange each copy of the manual as follows:
 - 1. One copy of an equipment data summary (see sample form) for each item of equipment.
 - 2. One copy of an equipment preventive maintenance data summary (see sample form) for each item of equipment.
 - 3. One copy of the manufacturer's operating and maintenance instructions. Operating instructions include equipment start-up, normal operation, shutdown, emergency operation and troubleshooting. Maintenance instructions include equipment installation, calibration and adjustment,

preventive and repair maintenance, lubrication, troubleshooting, parts list and recommended spare parts.

4. List of electrical relay settings and control and alarm contact settings.
 5. Electrical interconnection wiring diagram for equipment furnished including all control and lighting systems.
 6. One valve schedule giving valve number, location, fluid, and fluid destination for each valve installed. Group all valves in same piping systems together in the schedule. Obtain a sample of the valve numbering system from the ENGINEER.
 7. All information provided in the manual shall be modified so that it only includes information pertaining to the approved equipment and accurately depict the equipment provided. All "optional" and non-pertinent materials and information shall be excluded from the manual or noted as such.
 8. Furnish all O&M Manual material on 8-1/2 by 11 commercially printed or typed forms or an approved alternative format.
- B. Organize each manual into sections paralleling the equipment specifications. Identify each section using heavy section dividers with reinforced holes and numbered plastic index tabs. Use 3-ring, slant ring, hard-back binders Type No. AVE-VS11 as manufactured by Avery Company, or equal. Binder size shall be 3-inch maximum. Punch all loose data for binding. Arrange composition and printing so that punching does not obliterate any data. Print on the cover and binding edge of each manual the project title, and manual title, as approved by the ENGINEER.
- C. Leave all operating and maintenance material that comes bound by the equipment manufacturer in its original bound state. Cross-reference the appropriate sections of the CONTRACTOR's O&M manual to the manufacturers' bound manuals.
- D. Where more than one binder is required, label binders Volume 1, 2, and so on, and include the table of contents for the entire set, identified by volume number, in each binder.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

Waukesha Water Utility

Contract Package 5

Equipment Data Summary

Equipment Name: Specification Reference:

Manufacturer:

Name:

Address:

Telephone:

Number Supplied: Location/Service:

Model No: Serial No:

Type:

Size/Speed/Capacity/Range (as applicable):

Power Requirement (Phase/Volts/Hertz):

Local Representative:

Name:

Address:

Telephone:

NOTES:

Waukesha Water Utility

Contract Package 5

Preventive Maintenance Summary

Equipment Name:

Location:

Manufacturer:

Name:

Address:

Telephone:

Model No:

Serial No:

Maintenance Task	Lubricant/Part	D	W	M	Q	SA	A	O&M Manual Reference
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NOTES:

*D-Daily W-Weekly M-Monthly Q-Quarterly SA-Semi-Annual A-Annual

(NO TEXT FOR THIS PAGE)

SECTION 01 79 00

TRAINING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Training

1.2 TRAINING

- A. Training: Provide the services of knowledgeable, technically competent, factory trained specialists to instruct OWNER's personnel in the operation and maintenance of the equipment and system components listed in Paragraph B. The OWNER will furnish training classroom space.

1. Coordinate services with the OWNER, with a minimum of 30 days prior notice.
2. Provide a combination of classroom and "hands-on" instruction designed to completely familiarize operating and maintenance personnel with the systems theory, standard operating procedures, safety features and emergency procedures, and general maintenance of all components.
3. Conduct all training during regular hours on weekdays.

- B. Provide training on equipment listed in the following schedule, recommended by the manufacturer, or otherwise required:

<u>Specification</u>	<u>Equipment Name</u>	<u>Minimum Hours</u>
33 05 58	Cathodic Protection	4
33 05 70	Full Range EMS Markers	2
40 05 20	Air Valves	4
40 91 00	Pressure Transmitter and Pressure Gauge	2

- C. Length of Training: The minimum lengths of training sessions are listed in Paragraph B. above.
- D. Credentials: Submit for approval, credentials of equipment manufacturer representatives who are to be course instructors at least 14 days prior to a proposed training session.

- E. Scheduling: Submit training outline and other information described in paragraphs G through K for approval at least 14 days prior to the proposed date for the training sessions. Verify scheduling with the OWNER at least 14 days prior to the training sessions.
- F. Number of Copies: For each training class, provide instructional material for at least ten attendees plus five extra copies, plus duplicate copies of all audio-visual aids utilized during each training course.
- G. Training Outline Submission: Provide a proposed training outline including the topics presented in Paragraph K. Identify specific components and procedures in the proposed training outline.
- H. Training Topic Detail: Detail specific training topics. Describe "hands-on" demonstrations planned for the training. Reference training aids to be utilized in the training (i.e. video tapes, slides, transparencies) and attach where applicable.
- I. Training Handouts: Attach training handouts to the proposed training outline.
- J. Training Segment Duration: Indicate the duration of each training segment.
- K. Training Outline:
 - 1. Equipment Operation
 - a. Describe equipment's operating (process) function.
 - b. Describe equipment's fundamental operating principles and dynamics.
 - c. Identify equipment's mechanical, electrical and electronic components and features.
 - d. Identify all support equipment associated with the operation of the subject equipment.
 - 2. Detailed Component Description
 - a. Identify and describe in detail each component's function.
 - b. Where applicable, group related components into subsystems.
 - c. Identify, and describe in detail, equipment safety features and control interlocks.
 - 3. Equipment Preventive Maintenance

- a. Describe preventive maintenance inspection procedures required to perform and inspect the equipment in operation, and spot potential trouble symptoms (anticipate breakdowns).
 - b. Outline recommended routine lubrication and adjustments (preventive maintenance).
4. Equipment Troubleshooting
- a. Define recommended systematic troubleshooting procedures.
 - b. Provide component specific troubleshooting checklists.
 - c. Describe applicable equipment testing and diagnostic procedures to facilitate troubleshooting.
5. Equipment Corrective Maintenance
- a. Describe recommended equipment preparation requirements.
 - b. Identify and describe the use of special tools required for maintenance of the equipment.
 - c. Describe component removal/installation and disassembly/ assembly procedures.
 - d. Perform at least two "hands-on" demonstrations of common corrective maintenance repairs.
 - e. Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
 - f. Define recommended torquing, mounting, calibration, and alignment procedures and settings, as appropriate.
 - g. Describe recommended procedures to check/test equipment following corrective repair.
6. Evaluation and Acceptance of Training Programs
- a. Following the completion of each training session, participants will evaluate the content and effectiveness of the training session using the Training Session Evaluation Form included in this Specification. For each training session, the criteria scores (A through G) of each participant's evaluation form will be averaged. Any single criteria with an average below 3.0 will result in a failing grade and will

require the entire session to be reorganized and improved to address specific deficiencies noted in the returned evaluations, and rescheduled and executed for the target group. Provide repeated training courses or sessions at no additional cost to the OWNER.

- L. Certificate: Provide "Certificate of Instructional Services" signed by RESIDENT PROJECT REPRESENTATIVE and equipment representative, verifying that training has been accomplished to satisfaction of all parties. Use form provided in this section, and furnish RESIDENT PROJECT REPRESENTATIVE with three copies.
- M. Substantial Completion: Training provided by manufacturers' representative, RESIDENT PROJECT REPRESENTATIVE and OWNER does not constitute substantial completion.
- N. Equipment Use: Use of equipment for training will not void manufacturers' or contract warranties.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

CERTIFICATE OF INSTRUCTIONAL SERVICES

Project _____

Equipment _____

Specification Section _____

Contract _____

I hereby certify the equipment Manufacturers' Representative has instructed OWNER's personnel in startup operation and maintenance of this equipment as required in the Contract Documents.

MANUFACTURER'S REPRESENTATIVE

Signature _____

Name: (print) _____

Title: _____

Representing _____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title _____

RESIDENT PROJECT REPRESENTATIVE

Signature _____ Date _____

Name (print) _____

Title _____

COMMENTS:

Complete and submit three copies of this form to RESIDENT PROJECT REPRESENTATIVE upon completion of training as required by Specification Section 01 79 00.

TRAINING SESSION EVALUATION FORM

Name: _____

Date of Session: _____

Manufacturer/Supplier: _____

Equipment/System: _____

Criteria	Ranking (0 = completely unsatisfactory; 5 = completely satisfactory)					
A Trainers ability to communicate clearly	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○
B Trainers experience with the product/equipment	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○
C Ability to answer technical questions	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○
D Training materials relevant to the equipment and clearly written	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○
E Trainer is well organized	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○
F Trainer has provided ample time for questions and follow-up	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○
F Handouts of material presented are available	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○

SECTION 02 50 00

IMPACTED SOIL AND GROUNDWATER MANAGEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing the management and disposal of impacted soil and groundwater as follows:

1. Impacted soil or groundwater within the pipeline reaches shown and within the depths specified in the following schedule:

IMPACTED SOIL OR GROUNDWATER AREA SCHEDULE

Impacted Soil or Groundwater Area	Depth
Sites 12.57 and 12.58	Existing road base course bottom to bottom of excavation.
Site 12.51	Existing road base course bottom to 5 feet below existing grade.
Site 12.31	Existing road base course bottom to bottom of excavation.
Site 12.17	Existing road base course bottom to 5 feet below existing grade.

2. Impacted soil or groundwater that may be encountered outside of Impacted Soil or Groundwater Areas.

- B. Related Work Specified In Other Sections Includes, but is Not Limited to, the Following:

1. Section 01 29 00 - Measurement and Payment
2. Section 31 23 19 - Dewatering
3. Section 31 23 23 - Backfilling
4. Section 31 25 13 - Erosion and Sediment Controls

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:

1. City of New Berlin Municipal Code

2. City of Waukesha Municipal Code
3. Town of Waukesha Code of Ordinances
4. United States Code of Federal Regulations, Title 29: Labor, Part 1910 – Occupational Safety and Health Standards, Subpart H – Hazardous Materials, Chapter 120 – Hazardous Waste Operations and Emergency Response (29 CFR 1910.120)
5. United States Code of Federal Regulations, Title 29: Labor, Part 1910 – Occupational Safety and Health Standards, Subpart I – Personal Protective Equipment (29 CFR 1910 Subpart I)
6. United States Code of Federal Regulations, Title 49: Transportation (49 CFR)
7. Waukesha County Code of Ordinances
8. Wisconsin Administrative Code, Department of Natural Resources, Chapter 500; Environmental Protection – Solid Waste Management (WAC NR 500)
9. Wisconsin Administrative Code, Department of Natural Resources, Chapter 718; Environmental Protection – Investigation and Remediation of Environmental Contamination: Management of Contaminated Soil or Solid Wastes Excavated During Response Actions (WAC NR 718)
10. Wisconsin Administrative Code, Department of Natural Resources, Chapter 718; Environmental Protection – Investigation and Remediation of Environmental Contamination: Management of Contaminated Soil or Solid Wastes Excavated During Response Actions: Storage of Excavated Contaminated Soil, Requirements for Temporary Stockpiles (WAC NR 718.05(3))
11. Wisconsin Administrative Code, Department of Transportation (WAC TRANS)

1.3 DEFINITIONS

- A. Impacted Soil: Impacted soil is defined as, but not limited to, soil with distinguishable odor (e.g., petroleum) or non-natural fill material (e.g., foundry sand/slag, municipal trash, or other similar material) or as identified in this Section.
- B. Impacted Groundwater: Impacted groundwater is defined as, but not limited to, groundwater with distinguishable odor (e.g., petroleum) or groundwater with sheen or non-aqueous liquid (e.g., petroleum product) or as identified in this Section.

1.4 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.

B. Quality Control:

1. Impacted Soil:

- a. Landfill approval documentation.
- b. Soil disposal manifests.
- c. Waste characterization documentation, complete waste manifests, and tabulation of landfill weigh tickets with disposal tonnage.

2. Impacted Groundwater:

- a. Discharge approvals from authorities having jurisdiction that will be accepting the impacted groundwater.
- b. Tabulation of groundwater discharge quantities.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL

A. Comply with the following requirements in Impacted Soil or Groundwater Areas or in areas with suspected or encountered impacted soil or groundwater:

- 1. Federal, State, and local laws and regulations for excavating, transporting, and disposing of contaminated soil and groundwater, including the following:
 - a. 29 CFR 1910.120
 - b. 29 CFR 1910 Subpart I
 - c. 49 CFR
 - d. City of New Berlin Municipal Code
 - e. City of Waukesha Municipal Code
 - f. Town of Waukesha Code of Ordinances
 - g. WAC NR 500
 - h. WAC NR 718
 - i. WAC TRANS
 - j. Waukesha County Code of Ordinances

B. Coordinate with and provide access for the ENGINEER, ENGINEER's Consultant, or RESIDENT PROJECT REPRESENTATIVE who may observe excavation,

conduct sampling, or conduct monitoring of soil, groundwater, soil vapor, dust or ambient air during the Work.

- C. Identify off-site licensed solid waste landfill appropriate for disposal of impacted soil and take sole responsibility for meeting the requirements of the landfill.

3.2 IMPACTED SOIL

- A. Do not use excavated soil from the following Impacted Soil Area from the depths specified in the Impacted Soil or Groundwater Area Schedule and pipeline reaches shown as backfill. Excavate and directly load impacted soil into truck with waterproof tarpaulin cover to prevent material from escaping the truck. Properly dispose of impacted soil at a landfill.

- 1. Sites 12.57 and 12.58

- B. Excavated soil from the following Impacted Soil Areas from the depths specified in the Impacted Soil or Groundwater Area Schedule and pipeline reaches shown can be used as common fill if suitable in accordance with the requirements of Section 31 23 23 and as shown. Excavate and place impacted soil on six mil plastic sheeting prior to returning the soil to the excavation as backfill. Backfill so as to place excavated impacted soil at similar depth and location from which it was excavated. If impacted soil is not used as backfill, stockpile on six mil plastic sheeting as required and properly dispose of impacted soil at a landfill.

- 1. Site 12.17
 - 2. Site 12.51

- C. Excavate soil from the following Impacted Soil Area from the depths specified in the Impacted Soil or Groundwater Area Schedule and pipeline reaches shown in the presence of the ENGINEER's Consultant. Properly and temporarily stockpile impacted soil as directed by the ENGINEER's Consultant in accordance with the requirements of Section 31 25 13 and WAC NR 718.05(3). The RESIDENT PROJECT REPRESENTATIVE will coordinate with the ENGINEER's Consultant to investigate and confirm the nature and extent of the apparent impacted soil or groundwater. Handle or dispose of impacted soil or groundwater to such depth and along such extents as authorized in writing. Furnish submittals and proceed with the Work as specified in this Section and Division 1. Handling and disposal of impacted soil so authorized for the following Impacted Soil Area will be paid for under the appropriate Allowance Items in accordance with the requirements of Section 01 29 00.

- 1. Site 12.31

- D. Notify the RESIDENT PROJECT REPRESENTATIVE in writing if stockpiling of impacted soil is required. Temporarily stockpile impacted soil in accordance with the requirements of Section 31 25 13 and WAC NR 718.05(3) if:

1. Impacted soil excavated from Impacted Soil Areas is not immediately used as backfill.
 2. Impacted soil was not characterized prior to or during excavation for disposal off-site at a permitted landfill.
- E. Separately characterize impacted soil at each site requiring off-site disposal based on the requirements of the landfill at which the impacted soil will be disposed and as follows:
1. The soil waste characterization sample results included with the Technical Data may be used to supplement the waste characterization documentation as required by the landfill at which the impacted materials will be disposed.
 2. If requested by the landfill, supplement the Technical Data sample results to obtain required permits or approvals.
- F. Furnish submittals for impacted soil as follows:
1. Landfill acceptance documentation prior to commencing excavation at each site with impacted soil.
 2. Soil disposal manifests within 24 hours after disposal at a landfill.
 3. Waste characterization documentation, complete waste manifests, and tabulation of landfill weigh tickets with disposal tonnage no more than two weeks after disposal of impacted soil at a landfill at each site with impacted soil.
- G. Payment: Unless specified otherwise, handling and disposal of impacted soil in Impacted Soil Areas will be paid for under the Contract Item for Disposal of Impacted Soil and Groundwater in accordance with the requirements of Section 01 29 00.

3.3 IMPACTED SOIL OUTSIDE OF IMPACTED SOIL AREAS

- A. If, during the course of excavation, impacted soil in excavations is suspected or encountered outside of Impacted Soil Areas, immediately take the steps necessary to ensure worker health and safety, stop Work in the area with suspected or encountered impacted soil, safely secure the site, and notify the RESIDENT PROJECT REPRESENTATIVE in writing. Upon notification, the RESIDENT PROJECT REPRESENTATIVE will coordinate with the ENGINEER's Consultant to investigate and confirm the nature and extent of the apparent impacted soil or groundwater. Handle or dispose of impacted soil to such depth and along such extents as authorized in writing. Furnish submittals and proceed with the Work as specified in this Section and Division 1.

- B. Notify the RESIDENT PROJECT REPRESENTATIVE in writing if stockpiling of impacted soil is required. Properly and temporarily stockpile impacted soil in accordance with the requirements of Section 31 25 13 and WAC NR 718.05(3). Place excavated impacted soil in polyethylene-lined container with a waterproof tarpaulin cover. If container is not immediately available, place excavated material on six mil plastic sheeting, covered and secured to prevent wind or weather from damaging the cover. Within 48 hours, place stockpiled impacted soil into appropriate container with waterproof tarpaulin cover.
- C. If required, sample excavated material in the container for appropriate waste characterization required by the landfill at which the impacted soil will be disposed. Transport container containing excavated material to a designated location for stockpiling and disposal in accordance with the requirements of this Section. Otherwise, use impacted soil as backfill as specified in this Section.
- D. Payment: Handling and disposal of impacted soil so authorized outside of Impacted Soil Areas will be paid for under the appropriate Allowance Items in accordance with the requirements of Section 01 29 00.

3.4 IMPACTED GROUNDWATER

- A. Dewater and manage groundwater encountered at the following Impacted Groundwater Area:
 - 1. Sites 12.57 and 12.58
- B. Perform dewatering in accordance with the approved Water Control Plan and the requirements of Section 31 23 19, and the Milwaukee Metropolitan Sewerage District, the City of Waukesha's Clean Water Plant, or other authority having jurisdiction that has approved discharge of impacted groundwater to their collection system.
- C. At a minimum, containerize impacted groundwater in an appropriately sized and enclosed double wall tank and discharge impacted groundwater in accordance with the requirements of the Milwaukee Metropolitan Sewerage District, the City of Waukesha's Clean Water Plant, or other authority having jurisdiction that has approved discharge of impacted groundwater to their collection system.
- D. Separately characterize impacted groundwater at each site based on the requirements of the authority having jurisdiction that has approved discharge of impacted groundwater and as follows:
 - 1. Temporarily store impacted groundwater prior to characterization and approval for discharge as required. Notify the RESIDENT PROJECT REPRESENTATIVE in writing if storage of impacted groundwater is required.

2. The groundwater analytical results included with the Technical Data may be used to supplement the documentation required to obtain groundwater discharge permits or approvals.
 3. If requested by the authority having jurisdiction that will be accepting the impacted groundwater, supplement the Technical Data sample results to obtain required permits or approvals.
- E. Furnish submittals for impacted groundwater as follows:
1. Discharge approvals from authorities having jurisdiction that will be accepting the impacted groundwater prior to commencing dewatering at each site with impacted groundwater.
 2. Tabulation of groundwater discharge quantities no more than two weeks after completion of dewatering at each site with impacted groundwater.
- F. Payment: Handling and disposal of impacted groundwater within Impacted Groundwater Areas will be paid for under the Contract Item for Disposal of Impacted Soil and Groundwater in accordance with the requirements of Section 01 29 00.

3.5 IMPACTED GROUNDWATER OUTSIDE OF IMPACTED GROUNDWATER AREAS

- A. If, during the course of excavation, impacted groundwater in excavations is suspected or encountered outside of Impacted Groundwater Areas, immediately take the steps necessary to ensure worker health and safety, stop Work in the area with suspected or encountered impacted groundwater, safely secure the site, and notify the RESIDENT PROJECT REPRESENTATIVE in writing. Upon notification, the RESIDENT PROJECT REPRESENTATIVE will coordinate with the ENGINEER's Consultant to investigate and confirm the nature and extent of the apparent impacted soil or groundwater. Handle or dispose of impacted groundwater to such depth and along such extents as authorized in writing. Furnish submittals and proceed with the Work as specified in this Section and Division 1.
- B. Payment: Handling and disposal of impacted groundwater so authorized outside of Impacted Groundwater Areas will be paid for under the appropriate Allowance Items in accordance with the requirements of Section 01 29 00.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 26 05 00

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: General requirements for providing basic electrical materials and methods.
- B. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Certain equipment, control devices, conduit and wiring are shown on electrical drawings, but are specified in other sections pertaining to plumbing, heating, ventilating, air conditioning, temperature control systems, process equipment, process control systems and instrumentation. Install and connect these items to the electrical system as indicated or required in accordance with the Contract Documents.
- C. Overall Application of Specifications: This Section applies to all Division 26 sections and to other sections that include requirements for electrical equipment. Irrespective of where the electrical requirements are specified, provide and install all materials necessary for a complete operational system.
- D. Temporary Requirements: This Section applies to any temporary circuits, overcurrent devices, conduit, wiring, and other equipment required during changeover from the existing electrical system to a new electrical system. This Section also applies to temporary rewiring of lighting circuits, power circuits, instruments and devices.
- E. Comply with the “American Iron and Steel (AIS)” requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, further described in the Bid Form.

1.2 SYSTEM DESCRIPTION

- A. Design Requirements: Design requirements are specified in the applicable sections.
- B. Performance Requirements: Performance requirements are specified in the applicable sections.

1.3 SUBMITTALS

- A. General: Furnish all submittals, including the following, as specified in Division 01.
- B. Product Data and Information: Furnish a complete list of electrical equipment and materials to be furnished that shows the manufacturer, catalog number, size, type, capacity, voltage rating and other pertinent information related to each item on the list.
 - 1. Furnish catalog data for the manufacturer's standard equipment and materials. Clearly identify the equipment and devices specifically being proposed on manufacturers' catalog data sheets.
 - 2. Identification: Furnish a complete schedule or listing of system and equipment identification labels with legends.
- C. CONTRACTOR's Shop Drawings: Furnish shop drawings on items manufactured for the Contract.
 - 1. Furnish connection and schematic diagrams for each piece of electrical equipment where applicable. A manufacturer's standard connection or schematic diagram showing more than one method of wiring is not acceptable unless, the intended method is clearly marked.
 - 2. Furnish diagrams that show connections to field equipment. Clearly differentiate between manufacturer's and field wiring.
- D. Record Documents: Furnish record documents, and in addition to the requirements specified in Division 1, indicate installed conditions for:
 - 1. Raceway systems' sizes and locations; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker sizes and arrangements.
 - 2. Exposed and concealed equipment locations dimensioned from prominent building lines.
 - 3. Approved substitutions, and actual equipment and materials installed.

1.4 QUALITY ASSURANCE

- A. Codes: Provide all electrical Work in accordance with applicable local codes, regulations and ordinances. If there is a conflict between the requirements specified in the Contract Documents and the codes, follow the more stringent requirements as determined and approved.

- B. Testing: As a minimum, provide standard factory and field tests for each type of equipment. Other tests may be specified in the applicable equipment section.
- C. Labeling: Provide electrical equipment and materials that are listed and approved by Underwriters Laboratories or other OSHA recognized testing laboratories with the testing agency's label attached.
- D. Standard Products: Unless otherwise indicated, provide electrical materials and equipment which are the standard products of manufacturers regularly engaged in the production of such materials and equipment. Provide the manufacturer's latest standard design that conforms to these Specifications. Provide the products of the same manufacturer when two or more units of the same class of material and equipment are required.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle all products and materials as specified in Division 01 and as follows:
- B. Shipping and Packing: Provide materials and equipment suitably boxed, crated or otherwise completely enclosed and protected during shipment, handling, and storage. Clearly label such boxes, crates or enclosures with manufacturer's name, and name of material or equipment enclosed.
- C. Acceptance at Site: Conform to acceptance requirements as required in Division 1.
- D. Repair or replace all materials and equipment damaged by handling and storage as directed at no additional Contract cost.
- E. Storage and Protection: Protect materials and equipment from exposure to the elements and keep them dry at all times. Handle and store to prevent damage and deterioration in accordance with manufacturer's recommendations. Provide temporary power to space heaters where provided with equipment to prevent condensation from developing.

1.6 PROJECT CONDITIONS

- A. General: The Drawings indicate the extent and general arrangement of the principal electrical elements, outlets, devices and circuit layouts. Install and connect all electrical elements and devices to form a complete workable system as required by the Contract Documents, regardless of whether all system components are specifically stated in the Specifications or shown. Provide necessary materials and installation wherever required to conform to the specific requirements of the furnished equipment and for proper installation of the Work.
- B. Physical Layouts: In general, the routing of feeders show general arrangement and are not intended to show exact routing and locations of raceways. Verify actual and final arrangement, equipment locations, and prepare circuit and raceway

layouts before ordering materials and equipment. Equipment locations are approximate and are subject to modifications as determined by approved equipment dimensions.

- C. Coordination of Work: Coordinate the Work so that the electrical equipment may be installed without altering building components, other equipment or installations.
- D. Departure from Design: If departures from the design are deemed necessary due to structural conditions, obstructions or other problems, provide details of such departures and the reasons for requesting approval. Submit variations as soon as practical but no later than the submittal of the required raceway layout drawings. Do not depart from the design without written approval.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 ROUGH-IN

- A. Final Location: Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

3.2 ELECTRICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate electrical systems, equipment, and materials installation with other system components.
 - 2. Verify all dimensions by taking field measurements.
 - 3. Arrange for chases, slots, and openings in other system components as construction progresses to provide for electrical installations.
 - 4. Coordinate the installation of required supporting devices and sleeves to be set in cast-in-place concrete and other structural components, as they are constructed.
 - 5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 - 6. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing

regulations, franchised service companies, and controlling agencies.
Provide all required connections for each service.

7. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the ENGINEER for resolution.
8. Provide electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
9. Install systems, materials, and equipment providing right-of-way priority to systems required to be installed at a specified slope.
10. All wiring specified, scheduled, noted or shown is to be installed in conduit unless identified otherwise.

3.3 CUTTING AND PATCHING

- A. General: Perform cutting and patching as specified in Division 1. In addition to the requirements specified in Division 1, the following requirements apply:
 1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
 - a. Uncover Work to provide for installation of ill-timed Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 2. Cut, remove, and properly dispose of selected electrical equipment, components, and materials as indicated. Included are the removal of electrical items indicated to be removed and items made obsolete by the new Work. Deliver all removed serviceable apparatus to the OWNER as directed.
 3. Protect the structure, finishes, and adjacent materials not indicated or scheduled to be removed.
 4. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

5. Patch finished surfaces and building components using new materials that are compatible with the original installation and applied by experienced installers.

END OF SECTION

SECTION 26 05 10

ELECTRICAL UTILITY COORDINATION AND REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for arranging and coordinating with the Utility Company for permanent electrical power service.
- B. Comply with the “American Iron and Steel (AIS)” requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, further described in the Bid Form.

1.2 SYSTEM DESCRIPTION

- A. Utility Company: We Energies
1830 S West Ave, Waukesha, WI 53189
- B. Utility Company Contact: Michael C. Johnson
262-574-3051
Michael-C.Johnson@we-energies.com
- C. System Characteristics:
 - 1. 120/240 Volts
 - 2. 1 Phase
 - 3. 3 Wire
 - 4. Solidly Grounded Neutral

1.3 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 01.
- B. Correspondence: Furnish copies of all correspondence with the Utility Company including available short circuit currents and X/R ratings for each feeder.
- C. Utility Company Drawings: Furnish Utility Company prepared drawings.

1.4 QUALITY ASSURANCE

- A. General: Perform Work in accordance with Utility Company's written requirements and standards.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify that field measurements are as indicated on Utility Company drawings.

PART 2 PRODUCTS

2.1 UTILITY METERING

- A. Revenue Meters: Meters will be furnished by Utility Company.
- B. Meter Base: Provide meter base in accordance with the requirements of the Utility Company.

PART 3 EXECUTION

3.1 EXAMINATION

- A. General: Verify that service equipment is ready to be connected and energized.

3.2 PREPARATION

- A. Utility Company Arrangements: Make arrangements with Utility Company to obtain permanent electric service to the Project.

Utility Engineering and Facility Charges: Pay all charges and fees associated with securing both temporary and permanent electrical service for the project.

- B. Utility Company Access: Coordinate location of Utility Company's facilities to provide proper access.
- C. Coordination: Coordinate schedule of Utility Company's facilities with all other work.

3.3 INSTALLATION

- A. General: Install Electrical Power Service in accordance with the Utility Company's recommendations and approved shop drawings and as specified in Division 01.
- B. Meter Base: Install meter base in accordance with the Utility Company requirements and as shown.

END OF SECTION

SECTION 26 05 19

WIRES AND CABLES - 600 VOLTS AND BELOW

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing all wires and cables rated at 600 volts and below for complete electrical systems as shown.
- B. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 26 05 00 - Basic Electrical Materials and Methods
- C. Comply with the “American Iron and Steel (AIS)” requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, further described in the Bid Form.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ASTM B 3 - Standard Specifications for Soft or Annealed Copper Wire
 - 2. ASTM B 8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - 3. NFPA 70 - National Electrical Code (NEC)
 - 4. TIA/EIA 568-C.2 - Balanced Twisted-Pair Telecommunication Cabling and Components Standard
 - 5. Chapter PSC 114.002 - Wisconsin State Electrical Code, Volume 1

1.3 SUBMITTALS

- A. General: Furnish all submittals, including the following, as specified in Division 01 and Section 26 05 00 – Basic Electric Materials and Methods.
- B. Product Data and Information: Furnish manufacturer's catalog data for each type of wire and cable furnished.

1.4 QUALITY ASSURANCE

- A. General: Furnish wire and cable in accordance with applicable IEEE and NEMA standards and meeting the applicable requirements of the NEC and UL.
- B. Tests: Furnish factory tested cables prior to shipment in accordance with ICEA standards for the insulation specified.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle wire and cable in accordance with the manufacturer's instructions and as specified in Division 01.
- B. Storage: Store cable reels on concrete, 2x4 wood laggings or other hard surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for review.

- 1. Wire and Cable
 - a. Southwire Company
 - b. The Okonite Company
 - c. General Cable Corporation
- 2. Instrumentation Cable
 - a. Belden
 - b. Dekoron Wire and Cable
 - c. The Okonite Company
- 3. Data (Local Area Network) Cable
 - a. Belden
 - b. Alpha Wire
- 4. Multiconductor Cable
 - a. The Okonite Company
 - b. Southwire Company
- 5. Wire Connectors
 - a. Thomas & Betts/ABB Group

- b. 3 M/Electrical Products Division
- c. Ideal Industries

6. Color Coding Marker

- a. W. H. Brady Company
- b. Thomas & Betts/ABB Group

2.2 MATERIALS

- A. Conductors: Provide soft drawn or annealed copper stranded conductors with 98 percent minimum conductivity, meeting requirements of ASTM B 8. Solid No. 12 and No. 10 AWG meeting requirements of ASTM B 3 may be used in 120-volt branch-circuit wiring.
- B. Insulation: Provide wires and cables with insulation as follows:
 - 1. Power, control and lighting wiring
 - a. Single Conductor: Provide NEC Type XHHW-2 Cross-linked Polyethylene insulation.
 - b. Multiconductor Cables: Insulate individual conductors with 15 mils of polyethylene or PVC and 4-mil nylon jacket. Wrap the conductors with type binder and an outer jacket not less than 45 mils of PVC. Use ICEA Method 1 for color coding wires.
 - 2. Instrumentation Wiring: Provide single pair, stranded 16 AWG wire, 600 volt polyethylene insulation, twisted conductors, tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage and outer jacket of PVC
 - 3. Data (Local Area Network) Cable: Provide cable having third party verification to TIA/EIA 568-C.2-1 Category 6 requirements and constructed of four pair of solid No. 23 AWG solid copper wire, 300 volt polyolefin insulation, film tape separator and outer jacket of black industrial grade sunlight and oil resistant PVC.
- C. Printed Data on Covering: Provide the following information printed on the surface of all wires and cables at regular intervals throughout the entire length.
 - 1. Manufacturer or trade name.
 - 2. Size of conductor.
 - 3. Type of insulation.
 - 4. Voltage classification.

2.3 WIRE CONNECTIONS AND CONNECTING DEVICES

- A. Connectors for No. 10 AWG and Smaller: Provide insulated compression type butt connectors.
- B. Connectors for No. 8 AWG and Larger: Provide UL, Inc. listed compression type tube connectors for parallel or butt splices. Provide companion preformed plastic insulating covers or tape to provide insulation equal to conductor insulation.
- C. Miscellaneous Connectors: Provide preinsulated spring connectors for lighting and receptacle splices and pigtails.
- D. Solderless Lugs: Provide solderless terminal lugs for stranded and multiple solid conductors at connection to terminals or use UL listed crimp tool compression style lugs.
- E. Control Wire Terminations: Provide spade lug or pressure type control conductor connection terminations for control wiring terminations. Provide lug bolting at devices or bus bars with a flat washer, a Belleville washer and a locknut.

2.4 COLOR CODING

- A. General: Use a vinyl impregnated cloth tape resistant to oil, dirt and heat for conductor color coding.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Swab new and existing conduits to be used to clear debris and remove moisture before conductor installation. Install conductors in raceways with no splices between boxes.
- B. Pulling Equipment: Pull conductors using proper equipment without exceeding manufacturer's recommendation for maximum pulling tension. Protect conductor insulation jacket at all times from twists, kinks, scrapes, punctures and other damage. Replace damaged conductors. Pull wires and cables into ducts and conduit without the use of lubricants, except where such use is necessary and approved. Use UL listed lubricating compound compatible with the conductor insulated jacket and raceway.

Use lines of nylon or polypropylene, propelled by carbon dioxide, or compressed air, to snake or pull wire and cable into conduits. Do not use flat steel tapes or steel cables.

- C. Seals: Provide a seal between the conductor and conduit for conduits entering buildings or from areas where the temperature change may cause condensation or moisture. Seal the conduits after the conductors are in place.
- D. Color Coded Tape: Apply color coding tape at all terminations and splices with overlapping turns for a minimum length of two inches, starting two inches back from the termination point. Provide color code tape in all boxes and manholes. Provide color coding throughout the entire network for service, feeder, branch, control and low energy signal circuit conductors. Use the following color code for conductors.

COLOR CODING					
<u>System</u>	<u>Phase A</u>	<u>Phase B</u>	<u>Phase C</u>	<u>Neutral</u>	<u>Ground</u>
208Y/120V three-phase or 240/120 single-phase	Black	Red	Blue	White	Green
Control and low-energy signal	Red	---	---	White	Green
Instrumentation	Gray	---	---	---	--

- E. Terminations: Leave a minimum of six inches of free conductor at each connected outlet and a minimum of nine inches at unconnected outlets.
- F. NEC Requirements: Install wiring in accordance with applicable provisions of National Electrical Code, local codes having jurisdiction, and as indicated.
- G. Conductor Sizing: Size conductors in accordance with the NEC, local codes having jurisdiction and the following:
1. Size for branch lighting circuits so that the greatest voltage drop between lighting panel and center of load does not exceed two percent at rated load.
 2. Size conductors to limit the maximum conductor temperature to less than 75 degrees C, except where specifically stated otherwise.
 3. Use minimum conductor sizes as follows:
 - a. Power and lighting branch circuits, No. 12 AWG.
 - b. 120-volt control circuits, No. 14 AWG.
 - c. Instrumentation and signal wiring, 2 or 3 conductors No. 16 AWG stranded shielded.

4. Conductor Derating: Derate the conductor ampacity for installation in an ambient temperature of (40) degrees C.
- H. Instrumentation wiring: Install instrumentation wiring as follows:
1. Wherever possible provide continuous instrumentation wiring without splices from field device to instrument. Where connections are required, make all connections in terminal boxes.
 2. Terminate instrumentation wiring at terminal blocks only.
 3. Where instrumentation wire is required to be connected in a terminal box, provide an isolated terminal for each shield.
 4. Ground instrumentation shields and drain wires only at the panel end of loop.
 5. Install clear, heat-shrink, seamless tubing over exposed shields and drain wires in all terminal boxes, junction boxes, panels and field devices.
- I. Accuracy of Information: The number and sizes of wires and conduits indicated are for guidance only and are not necessarily the correct number and sizes necessary for actual equipment installed. Install as many wires and conduits of the required size as necessary for a complete electrical system, and provide adequately for the equipment actually installed.

3.2 CONDUCTOR IDENTIFICATION

- A. Labeling: Label each wire at both termination points and at each splice point in junction boxes. Carry individual conductor or circuit identification throughout, with circuit numbers or other identification clearly stamped on terminal boards and printed on directory cards in distribution cabinets and panelboards.
- B. Identification: Where the total number of control and signal wires is three or more and no terminal board is provided, identify each wire in junction boxes and cabinets by means of plastic slip-on wire marker.
- C. Color Coordination: Connect circuit conductors of the same color to the same phase throughout the installation.

3.3 WIRE AND CABLE CONNECTIONS TO EQUIPMENT

- A. General: Provide electrical connections to all equipment in strict accordance with the manufacturer's approved wiring diagrams, the Plans, or as approved. Repair or replace any damaged equipment resulting from erroneous connections.

3.4 CONNECTOR AND TERMINAL LUG INSTALLATION

- A. UL Requirements: Install all connectors and terminal lugs in accordance with UL requirements and manufacturer's recommendations.

3.5 QUALITY ASSURANCE

- A. Continuity Test: Perform continuity test to demonstrate proper cable connection.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 26 05 26

GROUNDING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing a complete grounding system as specified and shown. Grounding includes but is not limited to: electric equipment enclosures, raceway systems, panelboards, grounding rods, grounding conductors, bonding jumpers, water pipe connections, and structure metal frames as required.
- B. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 26 05 00 - Basic Electrical Materials and Methods
 - 2. Section 26 05 33 - Electrical Raceway Systems
 - 3. Section 26 05 19 - Wires and Cables - 600 Volts and Below
- C. Comply with the "American Iron and Steel (AIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, further described in the Bid Form.

1.2 REFERENCES

- A. Codes and Standards: The following codes and standards are referred to in this Section:
 - 1. NFPA 70 - National Electrical Code (NEC)
 - 2. Chapter PSC 114.002 – Wisconsin State Electrical Code, Volume 1

1.3 SUBMITTALS

- A. General: Furnish all submittals, including the following, as specified in Division 01.
- B. Product Data and Information: Furnish manufacturer's catalog data for the following:
 - 1. Grounding and grounded conductors
 - 2. Grounding connectors, clamps and bushings
 - 3. Grounding rods
 - 4. Bonding jumpers
- C. Quality Control: Furnish a field report stating the results of the system ground impedance test.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Construct a complete grounding system in accordance with applicable ANSI, IEEE Standards, the NEC and local codes.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle all products and materials as specified in Division 01.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for review.

- 1. Grounding and Grounded Conductors

- a. Okonite Company
 - b. Southwire Company

- 2. Grounding Rods

- a. Carolina Galvanizing Utility Products Division
 - b. Eritech Grounding Products
 - c. Superior Grounding Systems

- 3. Ground Rod Access and Test Well Box

- a. Hubbell Power Systems – Quazite
 - b. Oldcast Precast, Inc.
 - c. Thompson Lightning Protection
 - d. Eritech Grounding Products

2.2 MATERIALS

- A. General: Provide conductor sizes as shown or required.
- B. Materials: Provide conductors in accordance with the requirements specified in Section 26 05 19.
- C. Bare conductors: Provide bare copper conductor where buried in earth, embedded in concrete or exposed.
- D. Insulated Conductors: Provide copper conductor with green color insulation rated at 600 volts where installed in conduits or other enclosed raceways.

2.3 CONNECTORS

- A. Grounding Clamps and Bolted Connectors: Provide grounding clamps and bolted connectors suitable for devices or cables being connected.
- B. Welding: Provide the exothermic welding process for buried, concealed and accessible connections to structural members, ground rods, and case grounds. Clean and paint welds embedded in the ground or encased in concrete with asphalt base paint.
- C. Bolted Connectors: Provide bolted connectors for grounding to ground buses and equipment.
- D. Pipe Grounding: Provide copper, brass, or bronze grounding clamps for grounding pipes. Do not provide strap type clamps.
- E. Grounding Bushings: Provide grounding bushings for conduits where conduits are not effectively grounded by firm contact to the grounded enclosure.

2.4 GROUNDING RODS

- A. Length and Size: Provide grounding rods 3/4-inch in diameter and 10 feet long.
- B. Grounding Rod Material: Stainless steel.

2.5 GROUND ROD ACCESS AND TEST WELL BOXES

- A. Exterior Locations: Precast concrete or polymer concrete junction box with open bottom, UL listed, Tier 22 in accordance with ANSI/SCTE 77, with engraved/stamped cover reading "GROUND ELECTRODE".

PART 3 EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Install conductors to preclude exposure to physical damage.
 - 2. Install connections firm and tight.
 - 3. Arrange conductors and connectors without placing strain on the connections.
 - 4. Bury equipment grounding conductors as shown, or at a minimum of 12 inches below grade.
 - 5. Bring loops or taps up for connection to equipment or other items to be grounded.

6. Install an insulated grounding conductor in all conduits.
 7. When raceways are used to contain and protect grounding conductors, install in accordance with Section 26 05 33 and NEC.
 8. Where conductors are installed in nonmetallic raceway, provide the grounding conductor in addition to the neutral wire, sized in accordance with NEC or as scheduled.
 9. Perform exothermic welding with properly sized molds.
- B. Grounding Rod Installation:
1. Install grounding rods as shown with the top of the rod a minimum of 12 inches below grade.
 2. Drive grounding rods into permanently moist soil.
 3. Provide additional ground rod sections as required to reach permanently moist soil.
 4. Provide junction box without bottom for access to grounding rod and conductor where shown.
- C. Grounding Conductors: Connect the grounding conductor between the equipment and the grounding system. Where a ground bar is furnished with the panelboard, connect the grounding conductor to the bar.
- D. Miscellaneous Grounding: Provide grounding for the following:
1. Ground receptacles and switches and their metal plates through positive ground connection to the yoke/strap, outlet box and grounding system grounding wire installed in the conduit.
 2. Ground racks, supports, frames, covers and metal parts in manholes or handholes, controllers, motor frames, surge capacitors, arrestors, lighting fixtures, metal structures, exposed noncurrent carrying metal, mechanical equipment, and similar items.
 3. Provide ground connections to equipment using ground plates imbedded in the concrete pad so that the equipment can be removed without damaging grounding system. Provide a copper ground connection between ground plates and the equipment.

3.2 FIELD QUALITY CONTROL

- A. Tests: Conduct a witnessed test to determine the ground impedance for the entire system using a ground loop impedance tester. Provide a maximum impedance of 2 ohms at any point of the test. Add additional grounding rods if necessary to meet this requirement.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 26 05 33

ELECTRICAL RACEWAY SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing electrical raceway systems as indicated, in accordance with the Contract Documents.
- B. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 26 05 00 - Basic Electrical Materials and Methods
 - 2. Section 31 23 16 - Excavation
 - 3. Section 31 23 23 - Backfilling
- C. Comply with the “American Iron and Steel (AIS)” requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, further described in the Bid Form.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ANSI 77 - Specifications for Underground Enclosure Integrity
 - 2. ANSI C80.5 - Specifications for Aluminum Rigid Conduit
 - 3. ANSI/NFPA 70 - National Electrical Code
 - 4. NEMA TC2 - Electrical Polyvinyl Chloride (PVC) Conduit
 - 5. UL 360 - Standard for Liquid-Tight Flexible Steel Conduit
 - 6. UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit
 - 7. ASTM F2160 - Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD)
 - 8. NEMA TC 7 - Smooth Wall Coilable Electrical Polyethylene Conduit

9. UL 651A - Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
10. NEMA TCB 4 - Guidelines for the Selection and Installation of Smooth-Wall Coilable High-Density Polyethylene (HDPE) Conduit
11. Federal Specification WW-C-540C - Conduits, Metal, Rigid (Electrical, Aluminum)
12. Chapter PSC 114.002 - Wisconsin State Electrical Code, Volume 1

1.3 SUBMITTALS

- A. General: Furnish all submittals, including the following, as specified in Division 01 and Section 26 05 00.

1.4 QUALITY ASSURANCE

- A. Codes: Provide all materials and workmanship in accordance with the requirements of the National Electrical Code and local codes having jurisdiction.
- B. Regulatory Requirements: Provide UL listed components.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle all products and materials as specified in Division 01.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for review.
 1. Rigid PVC conduits:
 - a. Carlon – Thomas & Betts /ABB Group
 - b. Cantex Inc.
 - c. National Pipe & Plastics, Inc.

2. Aluminum Conduits:
 - a. Allied Tube and Conduit
 - b. Wheatland Tube Company/JMC Steel Group
 - c. Sapa Extrusions North America
3. Liquidtight and flexible steel conduit:
 - a. Electri-Flex Company
 - b. The International Metal Hose Co.
 - c. Southwire
 - d. Anamet Electrical, Inc.
 - e. Thomas & Betts /ABB Group
4. Conduit Fitting and Connectors
 - a. Appleton /Emerson Industrial Automation
 - b. Thomas & Betts/ABB Group
 - c. Eaton's Cooper Crouse-Hinds
 - d. O-Z Gedney/Emerson Industrial Automation
 - e. Hubbell - Killark
 - f. AdaletPLM/Scott Fetzer Company
5. Boxes and Enclosures:
 - a. Appleton /Emerson Industrial Automation
 - b. Raco/A Hubbell Company
 - c. Eaton's Cooper Crouse-Hinds
 - d. Thomas & Betts/ABB Group
 - e. Hoffman
 - f. Hope Electrical Products Company
 - g. O-Z Gedney/Emerson Industrial Automation
6. Strut Channel and Fittings
 - a. Allied Tube and Conduit
 - b. Eaton's Cooper B-Line Systems, Inc.
 - c. Thomas & Betts /ABB Group-SuperstrutEnduro Composites Inc.
 - d. Strut Tech Systems
 - e. Unistrut
7. Terminal Blocks
 - a. Phoenix Contact
 - b. ABB - Entrelec
 - c. Weidmuller

8. High Density Polyethylene (HDPE) Conduit

- a. Carlon
- b. Duraline
- c. Southwire
- d. Centennial Plastics

9. Handholes

- a. Quazite, a Hubbell Brand

10. Detectable Pulling Line

- a. Dura-Line

2.2 RACEWAYS

A. General: Provide minimum 3/4-inch raceways.

B. Raceway Requirements: Provide raceways meeting the following requirements:

- 1. Provide rigid heavy wall aluminum alloy 6063T-1 conduit in accordance with the requirements of UL 6, Federal Specification WW-C-540C and ANSI C80.5.
- 2. Provide rigid nonmetallic Schedule 80 PVC electrical conduit in accordance with the requirements of UL Standard 651 and NEMA Standard TC2 with solvent cement joints.
- 3. Provide liquidtight flexible single strip steel, hot-dip galvanized conduit with PVC jacket in accordance with requirements of UL 1. Provide a continuous copper bonding conductor wound spirally between convolutions on the inside of the conduit meeting requirements of UL 360 for conduit sizes 1-1/4-inch and smaller.
- 4. Provide SDR11 wall coilable HDPE conduit, color-coded orange, meeting the requirements of ASTM F2160 and NEMA TC7 and listed to UL 651A.

2.3 FITTINGS

A. General: Provide fittings of similar material as raceways.

B. Fittings Requirements: Provide fittings meeting the following requirements:

- 1. Set screw or indenter type fittings are not acceptable. Provide threaded connectors for all rigid or intermediate metal conduits.
- 2. Provide solvent cement connections for all rigid nonmetallic conduits.

3. Provide insulated connectors for liquidtight flexible conduit.
4. Bushings
 - a. Provide fittings of similar material as raceways.
 - b. Provide insulated nonmetallic bushing rated 105 degrees C for all installations where bonding is not required.
 - c. Provide insulated metallic grounding and bonding bushing rated 150 degrees C where bonding is required.
 - d. Provide insulated nonmetallic bell end bushing for raceway termination at splice closure pedestals.

2.4 BOXES AND CABINETS

A. Outlet Box Requirements:

1. Provide cast aluminum boxes for aluminum conduit systems.
2. Provide nonmetallic boxes and covers in PVC conduit systems.
3. Provide watertight gasketed covers held with nonferrous screws for all cast metal boxes.

B. Junction and Pull Box Requirements:

1. Provide cast aluminum boxes with mounting lugs, threaded hubs and gasket covers for surface mounted boxes
2. Provide cast steel or fabricated 10-gauge Type 316 stainless steel for boxes either partially or fully encased in concrete. For partially encased boxes provide sides return channel flanged around cover opening. For fully encased boxes provide flush covers. Provide continuously welded and ground smooth seams. Provide mounting lugs and threaded conduit hubs.
3. Provide watertight gasketed covers held with stainless-steel captive screw slot bolts.
4. Provide steel barriers in all boxes to isolate instrumentation wiring from all other wiring systems
5. Provide all boxes located outdoors meeting NEMA 4X, 316 stainless steel requirements.

C. Terminal Box Requirements:

1. Provide minimum 12 gauge stainless steel fabricated box with mounting lugs, floor stand, and hinged doors.
2. Provide the door with continuous piano hinge and 3 point lockable latch. Provide print pocket on inside of door.
3. Provide back plate fabricated from 12 gauge minimum steel with white enamel finish for mounting terminals and wire troughs.
4. Provide wire troughs consisting of plastic ducts with snap slot design and removable covers. Run all wiring within wire troughs.
5. Furnish a schedule of terminals with the following information
 - a. Source
 - b. Type of Signal
 - c. Function
6. Provide removable jumpers to allow operation of the equipment.
7. Separate analog terminals from all other terminals.
8. Provide sufficient quantity of terminals for each wire entering the terminal box plus 20 percent but not less than 10 spare terminals.
9. Terminals: All catalog numbers refer to Phoenix Contact Type for the purpose of establishing the standard of quality and general configuration desired.
 - a. Provide symmetrical type steel mounting rails, NS-35.
 - b. Analog Signals: Provide terminals in enclosed housing suitable for wires from 22 to 12 AWG rated 600 volts with gray body, knife disconnect and test connection socket on both sides of disconnect, Phoenix Contact Type UK 5-MTK-P/P.
 - c. Control and Alarm Signals: Provide terminals suitable for wires from 24 to 10 AWG rated 18 amperes at 600 volts, blue body, Phoenix Contact Type UK5N BU.
 - d. 120-Volt Power Wiring: Provide terminals suitable for wires from 18 to 10 AWG rated 30 amperes at 600 volts, hot (black body), neutral (white body), ground (green body) , Phoenix Contact Type UK5N BK, UK5N WH & UK5N GN, respectively.
10. Enclosures: Provide enclosures meeting the same NEMA criteria for the various areas as specified under Junction and Pullboxes.

D. Handholes

1. Provide polymer concrete handholes with Tier 22 load rating in accordance with ANSI 77
2. Provide handholes with straight walls, open bottom and mouseholes at bottom edge for raceway entry.
3. Provide each handhole with a matching one-piece lid, attached with two tamper-resistant bolts, and molded legend reading "FIBER OPTICS".
4. Provide handholes in dimensions indicated on the Drawings.
5. Quazite style "PG" or approved equal.

2.5 SUPPORTING DEVICES

A. Raceway Supports: Provide raceway supports meeting the following requirements:

1. Do not use perforated straps or plumbers tape for conduit supports.
2. Provide expansion bolts or inserts for fasteners in concrete, toggle bolts for hollow masonry or frame construction, and preset inserts for prestressed concrete.
3. Conduit Straps and Backs:
 - a. For metallic conduits, provide steel or malleable iron.
 - b. For nonmetallic and PVC coated conduits, provide PVC coated malleable iron with stainless steel anchors and bolts.
4. Conduit Hangers
 - a. For metallic conduits, provide steel adjustable conduit hangers or clevis hangers.
 - b. For nonmetallic and PVC coated conduits, provide PVC coated adjustable conduit hangers with stainless steel hardware.

2.6 DETECTABLE PULLING LINE

- A. Provide polyester pulling line integral tracer wire for signal locating.
- B. Provide nominal 5/8" width pulling line with minimum tensile strength of 1,800 pounds.

- C. Provide line with sequential foot markings.
- D. Dura-line Part number WP18LC or approved equal.

PART 3 EXECUTION

3.1 PREPARATION

- A. General: Install electrical equipment and material of the size, type and general routing as shown or required.
- B. Coordination with Reinforcing: Install raceway, fittings, boxes and cabinets free from direct contact with reinforcing steel.
- C. Alignment: Provide fasteners, anchor bolts, anchorage items and supports as required to insure proper and rigid alignment. Attach equipment with fasteners sized according to size and weight of the equipment and the thickness of the supporting surface.
- D. Aluminum Coating: Where aluminum is placed in contact with dissimilar metal or concrete, separate contact surfaces with gasket, nonabsorptive tape or coating to prevent corrosion.
- E. Grounding: Make metallic raceways electrically and mechanically continuous and ground as required. Install conduits continuous between outlets, boxes, cabinets and panels.

3.2 INSTALLATION

- A. General: Cut conduits square and deburr the cuts to the same degree as the conduit manufacturer. Fasten conduit securely to outlets, junction, pull and terminal boxes. Provide caps and seals to prevent the entrance of foreign material and moisture during installation and before pulling wire.
- B. Where conduit size is not shown, provide conduits one size larger than indicated in Table 4, Chapter 9 of the NEC.
- C. Saw cut aluminum conduit to prevent reduction in internal area.
- D. For mounting on concrete and masonry surfaces provide a minimum of 1/4 inch air space between conduit and mounting surface. Support and fasten conduit to structural members spaced in accordance with electrical codes. Support conduit at least every eight feet or less in accordance with NEC requirements.
- E. When two or more exposed conduits are in the same general routing, provide parallel installation with symmetrical bends.

- F. Make changes in direction with bends or fittings. Use factory-made bends or elbows wherever possible. Make field bends and offsets with a hand bender or conduit-bending machine.
- G. Run conduit in buildings with no more than the equivalent of three 90 degree bends between pull points. Provide no more than 125 feet of conduit runs between pull points. Provide pull boxes where shown, specified or wherever required to install conductors and to meet the above requirement.
- H. Install pull and junction boxes in accessible locations with working space in front of and around the installation. Obtain approval to locate boxes in finished areas.
- I. Where approved for encased installation, install conduits in slabs as close to the middle of concrete slabs as practicable without disturbing reinforcement. Do not use conduit with an outside diameter exceeding one-third of the slab thickness. Do not place conduits closer than three diameters on centers, except at cabinet locations where the slab thickness is increased.
- J. Pitch conduits to outlet boxes to avoid trapping moisture. Where dips are unavoidable in exposed conduit runs, install drain fitting at low point.
- K. Conduit Material Types: Provide conduit as follows:
 - 1. Provide aluminum conduit in all exposed outdoor installations, except as described below.
 - 2. Provide rigid nonmetallic Schedule 80 conduits underground, concrete encased or direct buried, unless specifically detailed otherwise.
 - 3. Provide HDPE conduit for future installation of outside-plant fiber optic cables where shown on the Drawings.
 - 4. Provide watertight hub fittings for all boxes, enclosures and cabinets located below grade or in wet, damp or corrosive areas.
 - 5. Provide rigid conduit connection where equipment is fixed and not subject to adjustment, mechanical movement or vibration. Provide union fittings to permit removal of equipment without cutting or breaking conduit.
 - 6. Provide liquidtight flexible conduit connection where equipment is subject to adjustment, mechanical movement or vibration.
 - 7. Coat all threads in aluminum conduit runs with graphite or other corrosion preventive compound.
 - 8. Penetrations: Make concealed penetrations for single conduits not more than 1/4-inch larger than the diameter of the conduit. Make penetrations through walls, ceilings and floors other than concrete for exposed conduits not more than 1/4-inch larger than the diameter of the conduit. Fill the voids

around conduit with caulking compound and finish the surface the same as the wall, ceiling or floor. Where a conduit enters through a concrete non-waterproofed wall, floor or ceiling, provide a Schedule 40 sleeve and fill the space between the conduit and sleeve with a plastic expandable compound. If the sleeve is not placed with the concrete, drill the hole not less than 1/2-inch and not more than one inch larger than the sleeve, center the sleeve and grout the sleeve for the total depth of penetrated concrete with non-shrink grout, polyurethane or silicone sealant.

- L. Boxes: Provide boxes of the proper dimensions for the size and quantity of conductors enclosed.
 - 1. For boxes mounted on steel, concrete and masonry surface, provide a minimum 1/4-inch non-metallic spacer to hold the box away from the surface.
 - 2. Remove debris including dust, dirt, wire clippings and insulation from the interior of boxes. Replace boxes with open conduit holes. Repair or replace damaged boxes as directed.
- M. HDPE Conduit: Install direct-buried HDPE conduit according to NEMA TCB 4, and National Electrical Code, Article 353.
 - 1. Conduit Route: Establish and mark exactly conduit or cable routing. Resolve routing near existing obstacles and coordinate with other site work. Maintain a 6-inch minimum horizontal clearance from the direct buried conduit to adjacent utility lines. Maintain a 6-inch minimum vertical clearance from the direct buried conduit to utility lines at crossovers. Adhere to lines, grades, elevations and dimensions as shown.
 - 2. Installation Method: Installation method for raceway shall be determined by method used for water pipeline installed in common alignment:
 - a. Where pipeline is installed in open trench, conduit shall be installed in trench, as shown on the Drawings.
 - b. Where pipeline is installed by horizontal directional drilling or jack-and-bore, conduit shall be installed by horizontal directional drilling in a separate run.
 - 3. Trench Excavation: Perform excavation work in accordance with the requirements of Section 31 23 16.
 - 4. Conduit: Place conduit in straight lines and with a minimum slope of 0.25 percent (3 inches per 100 feet). Slope conduit down to manholes, handholes and structures. Secure conduits in place to prevent floating and movement.
 - 5. Bends: Install 12-foot minimum radius bends in horizontal turns and vertical deflections. For bends used at ends of conduit runs, provide a

bending radius exceeding the minimum value indicated in National Electrical Code, Table 354.24 and the conduit manufacturer's recommended minimum radius.

6. Bedding and Backfilling:
 - a. Where conduit is installed in a common trench with other work, provide backfill as shown and meeting the requirements of Section 31 23 23.
 - b. Where conduit is installed in a dedicated trench, provide bedding and backfill for direct buried conduits or cables in accordance with Section 31 23 23.
7. Underground Warning Tape: Provide one detectable underground warning tape for each direct buried duct.
8. Install detectable pulling line in all HDPE conduit.

N. Handholes:

1. Establish and mark handhole locations exactly. Resolve locations near existing obstacles and coordinate with other sitework. Adhere to orientation, elevations and dimensions as indicated.
2. Hole Excavation: Install hole excavations meeting the requirements of Section 31 23 16.
3. Precast Handhole Installation: Place a 6-inch thick compacted crushed stone base on the bottom of the hole under the entire handhole enclosure.
4. Backfilling: Backfill meeting the requirements of Section 31 23 23.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing lighting and distribution panelboards including circuit breakers and cabinets.
- B. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 26 05 00 - Basic Electrical Materials and Methods
 - 2. Section 26 05 26 - Grounding
- C. Comply with the "American Iron and Steel (AIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, further described in the Bid Form.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. NEMA PB 1 - Panelboards
 - 2. UL 67 - Panelboards
 - 3. Fed. Spec. W-P-115 - Power Distribution Panel
 - 4. UL 486A - Wire Connectors and Soldering Lugs for Use With Copper Conductors
 - 5. NFPA 70 - National Electrical Code (NEC)
 - 6. Chapter PSC 114.002 - Wisconsin State Electrical Code, Volume 1

1.3 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 01 and Section 26 05 00.
 - 1. Product Data and Information: Provide the manufacturer's catalog data for panelboards, circuit breakers and accessories.

2. Operations and Maintenance Manuals: Furnish operation and maintenance manuals for the panelboards as specified in Division 01.

1.4 QUALITY ASSURANCE

- A. Codes: Provide all materials and workmanship meeting the requirements of the NFPA, the National Electrical Code and local codes.
 1. Design, fabricate and test the panelboards in accordance with applicable ANSI, IEEE and NEMA standards.
 2. Provide panelboards suitable for operation at their standard nameplate ratings in accordance with ANSI standards.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle all products and materials as specified in Division 01.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for review.
 1. Panelboards
 - a. ABB/GE Electrification Products
 - b. Square D/Schneider Electric Eaton/Cutler-Hammer
 - c. Eaton

2.2 MATERIALS

- A. General: Provide factory-assembled fully rated dead-front type, panelboards, suitable for surface or flush mounting with branch circuit breakers and a main circuit breaker or main lugs as indicated.
 1. Provide panelboards with a full capacity separate ground bus and connected to a three-phase four-wire or a single-phase three-wire service with insulated neutral buses as indicated.
 2. Provide panelboards with the voltage, frequency and current ratings as indicated conforming to NEMA Standard PB 1, Fed. Spec. W-P-115, UL 67, the NEC and local codes.
 3. Provide panelboards with copper main, neutral and ground buses as indicated.

4. Where required, label panelboards suitable for use as service entrance equipment.
- B. Bracing: Provide main bus bracing exceeding the lowest interrupting rating of any circuit breaker installed.
- C. Fabrication: Fabricate panelboards using galvanized steel, continuously welded. Provide cabinet fronts with doors over the circuit breakers. Provide doors fastened with concealed hinges and equipped with flush type catches.
 1. Provide panelboards at least 20 inches wide, 5-3/4 inches deep, with wiring gutters on both sides.
 2. Panelboards shall be suitable for industrial service and for the environment where they are located.

2.3 COMPONENTS

- A. Circuit Breakers: Provide bolt-on type branch and main circuit breakers.
 1. Furnish the frame sizes, trip settings and number of poles as indicated. Clearly identify the ampere trip rating on the circuit breakers. Provide 20-ampere, single-pole, 120 volt circuit breakers unless otherwise shown or scheduled.
 2. Provide all breakers with quick-make, quick-break, toggle mechanisms with automatic thermal-magnetic, inverse time-limit overload and instantaneous short circuit protection on all poles, unless otherwise indicated. Indicate automatic tripping by the breaker handle assuming a clearly distinctive position from the manual ON and OFF position. Design the breaker handle to be trip-free on overloads.
 3. Interrupting Rating: 10,000 rms symmetrical amperes for circuit breakers on 240 volt systems or less.
 4. Provide multipole breakers that utilize a common tripping bar.
 5. Provide ground fault interrupter circuit breakers for all circuits serving receptacles located below grade and outdoors and as scheduled.
 6. Provide full module size single-pole breakers. Do not install two-pole breakers in a single-pole module.
 7. Provide all 20 ampere, one pole circuit breakers with a lug wire range suitable for the termination of #14AWG through #8AWG. For circuit breakers with higher current ratings, provide lugs adequate for the wire sizes indicated on the Contract drawings.

8. Provide circuit breakers 100 amperes and smaller with a 60/75 degree C cable temperature rating.
- B. Surge Protection Devices (SPD): Provide each panelboard with a surge protection device tested to meet the requirements of a Type 2 device as defined in UL 1449 – 2014.

2.4 ACCESSORIES

- A. Circuit Breaker Handle Lock: Where shown, provide circuit breakers with handle clamp that holds the circuit breaker handle in the ON position.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Install all panelboards in accordance with manufacturer's recommendations and approved shop drawings and as specified in Division 1 and in compliance with the requirements of NEMA standards, NEC, and applicable ANSI Publications.
- B. Mounting Height: Mount all panelboards either surface or flush mounted as shown such that the height of the top operating handle does not exceed 6 feet 6 inches from the floor or surrounding grade.
- C. Coordination: Coordinate with other Work including cabling and wiring work to interface the installation of the panelboards.
- D. Torque Requirements: Tighten electrical connectors and terminals, including screws and bolts, in accordance with the equipment manufacturer's published torque tightening values for the equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals in accordance with UL 486A.
- E. Circuit Breaker Handle Lock: Install circuit breaker handle clamp on each circuit breaker as shown.
- F. Directory: Provide a laminated, printed directory with the following information:
 1. Circuit number
 2. Utilizing equipment

3.2 CLEANING AND PAINTING

- A. Shop Painting: Paint the panelboards with manufacturer's standard shop finish.

- B. Field Painting: Touch up scratched and marred surfaces to match the original finish.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for clearing of areas within the Contract limits and other areas shown, including Work designated in permits and other agreements, in accordance with the requirements of Division 1.
- B. Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 01 41 00 - Regulatory and Special Requirements
 - 2. Section 31 23 16 - Excavation
 - 3. Section 31 23 23 - Backfilling
 - 4. Section 31 25 13 - Erosion and Sediment Controls
 - 5. Section 32 90 00 - Landscape Work

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, including the supplemental specifications and recurring special provisions, referred to as the "State Specifications"

1.3 DEFINITIONS

- A. Clearing: Clearing is the removal from the ground surface and disposal, within the designated areas, of trees, brush, shrubs, down timber, decayed wood, other vegetation, rubbish and debris as well as the removal of fences.
- B. Grubbing: Grubbing is the removal and disposal of stumps, buried logs, roots larger than 2 inches, matted roots and organic materials.

PART 2 MATERIALS

Not Used

PART 3 EXECUTION

3.1 PROTECTION

- A. Provide erosion control prior to start of Work in accordance with Section 31 25 13. Maintain and repair damaged erosion control items throughout Work.
- B. Do not divert or relocate surface water without written approval from the RESIDENT PROJECT REPRESENTATIVE.
- C. Protect benchmarks, survey control points, and existing structures from damage or displacement.
- D. Keep entrances and exits, and adjacent roadways affected, free from debris from clearing operations.

3.2 TREE REMOVAL

- A. Tree Removal Within Work Limits: Remove trees and shrubs as necessary for the Work within the Work limits shown unless otherwise indicated.
 - 1. Remove trees and shrubs to avoid damage to trees and shrubs designated to remain.
 - 2. Grub and remove tree stumps and shrubs felled to an authorized disposal site. Fill depressions created by such removal with material suitable for backfill as specified in Section 31 23 23 unless excavation in that area is imminent.
 - 3. Fell trees in accordance with Section 201 of the State Specifications.
- B. Tree Removal Outside Work Limits: Do not cut or damage trees outside the Work limits unless shown to be removed or unless written permission has been obtained from the RESIDENT PROJECT REPRESENTATIVE and the property owner or the authority having jurisdiction. Furnish three copies of the written permission before removal operations commence.
- C. Between April 1 and September 30 paint the cut surfaces of the stumps of healthy oak trees and saplings in accordance with Section 201 of the State Specifications.

3.3 TREES AND SHRUBS TO BE SAVED

- A. Protection: Protect trees and shrubs within the limits of construction as shown to be saved from defacement, injury and destruction.
 - 1. Work within the limits of the tree drip line with extreme care using either hand tools or equipment that will not cause damage to trees.

- a. Do not disturb or cut roots unnecessarily. Do not cut roots 2 inches and larger unless approved.
 - b. Immediately backfill around tree roots after completion of construction in the vicinity of trees.
 - c. Do not operate any wheeled or tracked equipment within drip line.
2. Protect vegetation from damage caused by emissions from engine-powered equipment.
3. During working operations, protect the trunk, foliage and root system of trees to be saved with boards or other guards as required to prevent damage, injury and defacement.
 - a. Do not pile excavated materials within the drip line or adjacent to the trunk of trees.
 - b. Do not allow runoff to accumulate around trunk of trees.
 - c. Do not fasten or attach ropes, cables, or guy wires to trees without permission. When such permission is granted, protect the tree before making fastening or attachments by providing burlap wrapping and softwood cleats.
 - d. The use of axes or climbing spurs for trimming will not be permitted.
 - e. Provide climbing ropes during trimming.
4. Remove trees and shrubs to be saved, taking a sufficient earth ball with the roots to maintain the tree or shrub.
 - a. Temporarily replant if required, and replace at the completion of construction in a condition equaling that which existed prior to removal.
 - b. Replace in kind if the transplant fails. Provide transplanting, planting, and watering and guarantee as specified in Section 32 90 00.
5. Have any tree and shrub repair performed by a tree surgeon properly licensed in the State of Wisconsin and within 24 hours after damage occurred.

3.4 CLEARING AND GRUBBING

- A. Clearing: Clear items specified to the limits shown and remove cleared and grubbed materials from the site.

1. Do not start earthwork operations in areas where clearing and grubbing is not complete, except that stumps and large roots may be removed concurrent with excavation.
 2. Comply with erosion, sediment control and storm management measures as specified in Division 1.
- B. Grubbing: Clear and grub areas to be excavated, areas receiving less than 3 feet of fill and areas upon which structures are to be constructed.
1. Remove stumps and root mats in these areas to a depth of not less than 1 foot below the subgrade of sloped surfaces.
 2. Fill depressions made by the removal of stumps or roots with material suitable for backfill as specified in Section 31 23 23 unless excavation in that area is imminent.
- C. Limited Clearing: Clear areas receiving more than 3 feet of fill by cutting trees and shrubs as close as practical to the existing ground. Grubbing will not be required.
- D. Disposal: Dispose of cleared and grubbed materials off-site in accordance with Section 201 of the State Specifications.
- E. Burning: Burning of cleared and grubbed materials is not allowed.
- 3.5 TOPSOIL
- A. Stripping: Strip existing topsoil from areas that will be excavated or graded prior to commencement of excavating or grading and place in well-drained stockpiles in suitable locations as shown, as specified in this Section, and as directed by the RESIDENT PROJECT REPRESENTATIVE. Segregate soils wetland, waterway, and agricultural areas in accordance with Section 01 41 00.

END OF SECTION

SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for performing open-cut excavations to the widths and depths necessary for constructing structures, pipelines and conduits including excavation of any material necessary for any purpose pertinent to the construction of the Work. Refer to Section 01 41 00 for excavating requirements in wetland, waterway, and agricultural areas.
- B. Related Work Specified In Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 01 41 00 - Regulatory and Special Requirements
 - 2. Section 02 50 00 - Impacted Soil and Groundwater Management
 - 3. Section 31 10 00 - Site Clearing
 - 4. Section 31 23 19 - Dewatering
 - 5. Section 31 23 23 - Backfilling
 - 6. Section 31 41 00 - Shoring, Sheet piling and Bracing

1.2 DEFINITIONS

- A. Earth: "Earth" includes materials which, in the opinion of the RESIDENT PROJECT REPRESENTATIVE, do not require blasting, barring, or wedging for their removal from their original beds. Specifically excluded are ledge and bedrock, boulders larger than 3-feet in diameter, or pieces of masonry larger than one cubic yard in volume.
- B. Rock: "Rock" includes materials which, in the opinion of the RESIDENT PROJECT REPRESENTATIVE, require blasting, ramming, barring or wedging for removal from their original beds and which have compressive strengths in their natural undisturbed state in excess of 300 psi. Boulders and cobbles larger than 3-feet in diameter and masonry larger than one cubic yard in volume are classed as rock excavation.

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1 and Section 31 41 00.
- B. Shop Drawings:

1. An Excavation Dewatering Plan in accordance with Section 31 23 19.
 - a. Obtain approval before beginning excavations below groundwater.
 - b. Maintain one copy of the dewatering plan at the project site to be available for inspection while dewatering operations are underway.

1.4 SITE CONDITIONS

- A. Geotechnical Investigation: Geotechnical investigations and reports were prepared by Professional Service Industries, Inc. (PSI) and GESTRA Engineering, Inc. and are intended only for use by the OWNER and ENGINEER in preparing the Contract Documents.
 1. The geotechnical reports are included as an appendix for reference only. However, this information is not guaranteed as to its accuracy or completeness.
 2. The geotechnical reports are for information purposes only and are not part of the Contract Documents.
- B. Actual Conditions: Make any geotechnical investigations deemed necessary to determine actual site conditions.
- C. Underground Utilities: Locate and identify existing underground utilities prior to the commencement of Work a minimum of 2,000 linear feet ahead of pipe laying operations.
- D. Quality and Quantity: Make any other investigations and determinations necessary to determine the quality and quantities of earth and rock and the methods to be used to excavate these materials.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL

- A. Clearing: Clear open-cut excavation sites of obstructions preparatory to excavation. Clearing in accordance with Section 31 10 00, includes removal and disposal of vegetation, trees, stumps, roots and bushes, except those specified to be protected during trench excavation.

- B. Banks: Shore or slope banks to the angle of repose to prevent slides or cave-ins in accordance with Section 31 41 00.
- C. Hazardous Materials: If hazardous materials not specifically shown or noted are encountered, proceed in accordance with General Conditions Article 5.06, Hazardous Environmental Conditions at Site and Section 02 50 00.
- D. Remove material from excavations including fragments of brick, cinders, concrete, gravel, rock fragments, lumped subsoil, boulders and rock and miscellaneous loose fill.
- E. Where required or directed by the RESIDENT PROJECT REPRESENTATIVE, furnish and install trench bridging, sufficient to support live load surcharge and wheel loading, over open trenches crossing roadways. Bridging may consist of either steel plates, composite timber construction, or prefabricated structural steel members. Secure bridging against the possibility of shifting or dropping into the open trench. Bridging is not to be left in the roadway overnight during winter months unless specifically required by the RESIDENT PROJECT REPRESENTATIVE.
- F. Excess Materials: Dispose of excess unsuitable materials, such as fragments of brick, cinders, concrete, and other materials and debris in accordance with applicable laws and regulations.

3.2 EXCAVATION FOR PAVEMENT

- A. Cut exposed concrete or bituminous concrete pavement, including concrete pavement, asphaltic pavement, concrete sidewalk, concrete curb, concrete curb and gutter and asphaltic recreation trails, with pavement saw prior to breaking. Saw a straight joint.
- B. Use equipment and methods for removing pavement, curbs and sidewalk to prevent cracking, shattering or spalling of the pavement remaining in place.
- C. For concrete pavements, saw cut at the nearest joint and remove the entire slab after approval by the RESIDENT PROJECT REPRESENTATIVE.
- D. Handle, transport, and dispose of removed pavement at an off-site disposal location. Obtain the off-site disposal location in a timely manner as to not inhibit progress of the Work.
- E. Other Requirements: Follow, where applicable, the requirements of the subsections of this Section on “Trench Excavation”, “Short Tunnel Excavation” and “Excavation for Jacking and Augering”.

- F. Drainage Structures: Unless shown or specified otherwise, preserve pipes, vaults, manholes and inlets for any stormwater drainage system. Minimize damage to the structures.

3.3 STRUCTURE EXCAVATION

- A. Excavation Size: Provide excavations of sufficient size and only of sufficient size to permit the Work to be economically and properly constructed in the manner and of the size specified.
- B. Excavation Shape: Shape and dimension the bottom of the excavation in earth or rock to the shape and dimensions of the underside of the structure or drainage blanket wherever the nature of the excavated material permits.
- C. Compaction: Before placing foundation slabs, footings or backfill, proof roll the bottom of the excavations to detect soft spots.
 - 1. For accessible areas, proof roll with a ten wheel tandem axle dump truck loaded to at least 15 tons or similarly loaded construction equipment.
 - 2. For small areas, proof roll with a smooth-faced steel roller filled with water or sand, or compact with a mechanical tamper.
 - 3. Make one complete coverage, with overlap, of the area.
 - 4. Over-excavate soft zones and replace with compacted select fill in accordance with Section 31 23 23.

3.4 TRENCH EXCAVATION

- A. Preparation: Properly brace and protect trees, shrubs, poles and other structures which are to be preserved. Unless shown or specified otherwise, preserve trees and large shrubs. Hold damage to the root structure to a minimum. Small shrubs may be preserved or replaced with equivalent specimens.
- B. Adequate Space: Keep the width of trenches to a minimum, however provide adequate space for workers to place, joint and backfill the pipe properly.
 - 1. Do not allow the clear width of the trench at the level of the top of the pipe to exceed the sum of the outside diameter of the pipe barrel plus 2 feet, unless otherwise approved.
 - 2. In sheeted trenches or when trench boxes are used, measure the clear width of the trench at the level of the top of the pipe to the inside of the sheeting or trench box.

3. Should the maximum trench widths specified above be exceeded without written approval, provide concrete cradle or encasement for the pipe as directed. No separate payment will be made for such concrete cradle or encasement.
- C. Depth: Excavate trenches to a minimum depth of 6 inches below the bottom of the pipe or the bottom of encasement for electrical conduits, unless otherwise shown, specified or directed, so that pipe bedding material can be placed in the bottom of the trench and shaped to provide a continuous, firm bearing for conduit encasement, pipe barrels, and bells.
 1. If, without direction from the RESIDENT PROJECT REPRESENTATIVE, the trench has been excavated below the required depth for pipe bedding material placement, fill the excess depth with pipe bedding material as specified herein to the proper sub-grade.
- D. Unstable Materials: If soft, low strength, wet, loose, organic, or otherwise unsuitable material is exposed at the level of the bottom of the trench excavation, excavate the material in accordance with the subsection headed "Authorized Additional Excavation".
 1. When, in the judgment of the RESIDENT PROJECT REPRESENTATIVE, the unstable material extends to an excessive depth, the RESIDENT PROJECT REPRESENTATIVE may advise, in writing, the need for stabilization of the trench bottom with additional pipe bedding material, crushed stone, or gravel mat or the need to provide firm support for the pipe or electrical conduit by other suitable methods.
 2. Payment for such trench stabilization will be made under the appropriate Contract Items or where no such items exist, as a change in the Work.
- E. Length of Excavation: Backfill trenches at the end of each day, or in lieu thereof, cover trenches by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of the day. If steel plates are used, limit the length of trench covered by the steel plate to 40 feet.
- F. Provide ladders for a means of exit from the trench as required by applicable safety and health regulations.
- G. Water: Allow no water to rise in the trench excavation until sufficient backfill has been placed to prevent pipe or conduit flotation.

3.5 SHORT TUNNEL EXCAVATION

- A. Short Tunnel Requirements: In some instances, trees, shrubs, utilities, sidewalks and other obstructions may be encountered, the proximity of which may be a

hindrance to open-cut trench excavation. In such cases, excavate by means of short tunnels in order to protect such obstructions against damage.

1. Construct the short tunnel by hand, auger or other approved method approximately 6 inches larger than the diameter of pipe bells or outer electrical conduit encasement.
2. Consider such short tunnel Work incidental to the construction of pipelines or conduits and appurtenances. The need for short tunnels will not be grounds for additional payment.

3.6 EXCAVATION FOR JACKING AND AUGERING

- A. Jacking and Augering Requirements: Allow adequate length in jacking pits to provide room for the jacking frame, the jacking head, the reaction blocks, the jacks, auger rig, and the jacking pipe. Provide sufficient pit width to allow ample working space on each side of the jacking frame. Allow sufficient pit depth such that the invert of the pipe, when placed on the guide frame, will be at the elevation desired for the completed line. Tightly sheet the pit and keep it dry.

3.7 ROCK EXCAVATION

- A. Rock Excavation: Excavate rock within the boundary lines and grades as shown, specified or required.
 1. Rock removed from the excavation becomes the property of the CONTRACTOR. Handle, transport, and dispose of excavated rock at an off-site disposal location. Obtain the off-site disposal location.
 2. Remove shattered rock and loose pieces.
- B. Structure Depths: For cast-in-place structures, excavate the rock only to the bottom of the structure, foundation slab, or drainage blanket.
- C. Trench Depth: For trench excavation in which pipelines or electrical ducts are to be placed, excavate the rock to a minimum depth of 6 inches below the bottom of the pipe or duct encasement and refill the excavated space with pipe bedding material. Include placing, compacting and shaping pipe bedding material in the appropriate Contract Items.
- D. Vault and Manhole Depths: For vault and manhole excavation, excavate the rock to a minimum depth of 8 inches below the bottom of the vault or manhole base for pipelines 24 inches in diameter and larger and 6 inches below the bottom vault or manhole base for pipelines less than 24 inches in diameter. Backfill the excavated space with select fill material. Include placing, compacting and shaping select fill material for vault and manhole bases in the appropriate Contract Items.

- E. Over-Excavated Space: Backfill the excavated space in rock below structures, pipelines, conduits, vaults, and manholes, which exceeds the specified depths as shown, as specified, and with Class D concrete, pipe bedding, flowable fill, flowable fill with cement, select fill, or other material as directed by the RESIDENT PROJECT REPRESENTATIVE.
- F. Other Requirements: Follow, where applicable, the requirements of the subsections on "Trench Excavation" and "Substructure Excavation".
- G. Payment: Rock excavation, including ramming, removing from trench, handling, stockpiling, and hauling off-site will be paid for under the appropriate Contract Item. Placing, compacting and shaping of the additional pipe bedding or fill material, will be paid for under the appropriate Contract Items or where no such items exist, as a change in the Work.
- H. Blasting: Blasting will not be permitted.
- I. Rock Excavation in Agricultural Areas: Provide rock removal within agricultural areas in accordance with Section 01 40 00.

3.8 FINISHED EXCAVATION

- A. Finish: Provide a reasonably smooth finished surface for excavations, which is uniformly compacted and free from irregular surface changes.
- B. Finish Methods: Provide a degree of finish which is ordinarily obtainable from blade-grade operations, except as otherwise specified in Section 31 23 23.

3.9 PROTECTION

- A. Traffic and Erosion: Protect newly graded areas from traffic and from erosion.
- B. Barriers: Provide adequate fencing / barriers for fall protection around open excavations. Where excavations are to be left open overnight, cover the entire excavation with a steel road plate or in accordance with the requirements of the authority having jurisdiction and as specified.
- C. Repair: Repair any settlement or washing away that may occur from any cause, prior to acceptance. Re-establish grades to the required elevations and slopes.
- D. Other Requirements: Conduct Work in accordance with the environmental protection requirements specified in Division 1.

3.10 AUTHORIZED ADDITIONAL EXCAVATION

- A. Additional Excavation: Carry the excavation to such additional depth and width as authorized in writing, for the following reasons:

1. In case the materials encountered at the elevations shown are not suitable.
 2. In case it is found desirable or necessary to go to an additional depth, or to an additional depth and width.
- B. Backfill Materials: Backfill such excavated space with either authorized Class D concrete, pipe bedding, flowable fill, flowable fill with cement, or select fill material, as shown and directed.
- C. Compaction: Where directed or specified for the material, compact fill materials to avoid future settlement.
- D. Payment: Additional earth excavations so authorized and concrete, pipe bedding, flowable fill, flowable fill with cement, or select fill materials authorized for filling such additional excavation and compaction of fill materials will be paid for under the appropriate Contract Items or where no such items exist, as a change in the Work.

3.11 UNAUTHORIZED EXCAVATION

- A. Stability: Backfill any excavation carried beyond or below the lines and grades shown, except as specified in the subsection headed "Authorized Additional Excavation", with such material and in such manner as may be approved in order to provide for the stability of the various structures.
- B. Backfill Materials: Backfill spaces beneath vaults, manholes, structures, pipelines, or conduits excavated without authority with Class D concrete, pipe bedding, flowable fill, flowable fill with cement, or select fill material, as approved.
- C. Payment: Backfill for unauthorized excavation will not be measured and no payment will be made therefor.

3.12 SEGREGATION STORAGE AND DISPOSAL OF MATERIAL

- A. Stockpiling Suitable Materials: Stockpile topsoil suitable for final grading and landscaping and excavated material suitable for backfilling or embankments separately on the site in approved locations.
- B. Stockpile Locations: Store excavated and other material a sufficient distance away from the edge of any excavation to prevent its falling or sliding back into the excavation and to prevent collapse of the wall of the excavation. Provide not less than 2 feet clear space between the bottom of any stockpile and other material and the top edge of any excavation. Do not stockpile materials where it will cause interference with the Work or prevent proper drainage of surface water. Prevent erosion and sediment run-off. Do not stock pile in wetlands areas with standing water.

- C. Excess Materials: Stockpile sufficient excess suitable material for utilization as backfill material for authorized additional excavation. Transport and dispose of surplus excavated material and excavated material unsuitable for backfilling or embankments at an off-site disposal location. Obtain the off-site disposal location in a timely manner so as to not inhibit progress of the Work.
- D. Wetland, Waterway, and Agricultural Areas: Segregate soils in wetland, waterway, and agricultural areas in accordance with Section 01 40 00.

3.13 REMOVAL OF WATER

- A. During excavation and until completion and acceptance of the Work at final inspection, provide ample means and equipment with which to remove promptly and dispose of properly water entering any excavation or other parts of the Work in accordance with the requirements of Section 31 23 19.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 31 23 19

DEWATERING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for controlling, handling, and disposing of groundwater and surface water encountered on site.
- B. Related Work Specified In Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 01 41 00 - Regulatory and Special Requirements
 - 2. Section 31 23 16 - Excavation
 - 3. Section 31 23 23 - Backfilling
 - 4. Section 31 25 13 - Erosion and Sediment Controls
 - 5. Section 33 05 50 - Laying and Jointing Buried Pipelines

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. State of Wisconsin Department of Natural Resources, Storm Water Construction and Post-Construction Technical Standards, Conservative Practice Code No. 1061, Dewatering, referred to as "Technical Standard 1061"

1.3 SYSTEM DESCRIPTION

- A. Identify and obtain permits required for dewatering and disposal by state and local authorities having jurisdiction. Comply with permit requirements.
- B. Take sole responsibility for the design and adequacy of the dewatering system necessary to accomplish the Work as shown or specified.
- C. Design dewatering system capable of relieving hydrostatic pressure against the height of the excavation walls and of lowering the hydrostatic level to a minimum of 12 inches below the bottom of the required excavations.

1.4 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.

B. Quality Control:

1. An Excavation Dewatering Plan that addresses site surface water and groundwater conditions, the type and arrangement of the equipment to be used, and the proper method of groundwater disposal. Prepare the Excavation Dewatering Plan before beginning excavations below groundwater. Maintain one copy of the Excavation Dewatering Plan at the project site to be available for inspection while dewatering operations are underway. Resubmit revised or amended Excavation Dewatering Plan if system is modified during installation or operation. ENGINEER's review of Excavation Dewatering Plan will be limited to confirming that the design was prepared by a Licensed Professional Engineer registered in the State of Wisconsin. Include the following in the Excavation Dewatering Plan:
 - a. A certificate signed and sealed by a Licensed Professional Engineer experienced in dewatering and registered in the State of Wisconsin that certifies that the Licensed Professional Engineer has evaluated and approved the CONTRACTOR's Excavation Dewatering Plan and has prepared complete design calculations and working drawings.
 - b. Evidence of written approval from state and local authorities having jurisdiction over dewatering and stormwater control.
 - c. Descriptions, methods, and working drawings showing locations and dimensions of proposed subsurface and surface water control facilities, including equipment, power supply, excavations, existing and new utilities and structures, siltation pond, means of measuring inflow to excavations, observation wells, pollution control facilities, screens and filter media, discharge locations to be utilized, and standby equipment. Note locations of generators and other noise producing equipment and anticipated decibel levels.
 - d. Templates of well record forms to be maintained during dewatering operations.
 - e. Emergency observation plans to be put into operation during failure of the dewatering system.
 - f. Approved permits required for dewatering and disposal by State and local authorities have jurisdiction.
2. Monthly Dewatering System Monitoring Reports containing the following information:
 - a. For observation wells, include daily piezometric levels identified by date, time, well number and system pumping rate. For piezometric levels, include feet of drawdown and groundwater elevation.

- b. For dewatering wells, include suspended material test results by date, time, well number, well pumping rate and system pumping rate.
 - c. Installation records for new wells.
- 3. Timing and records of maintenance tests for primary and standby dewatering systems including the following:
 - a. Maintenance tests and water quality tests for suspended matter at the discharge point including date, time of day, elapsed times of tests procedures, components tested, suspended particles, general observations and well readings.
 - b. Daily discharge rates.
 - c. Dewatering well installation and removal records.
 - d. Observation well installation and removal records.
 - e. General observations of the system such as equipment running times and failures.

1.5 SITE CONDITIONS

- A. Subsurface Investigation: Subsurface geotechnical and environmental investigations and reports were prepared by the Engineer's Consultants and are intended only for use by the OWNER and ENGINEER in preparing the Contract Documents.
 - 1. The subsurface investigation reports may be examined for whatever value they may be considered to be worth. However, this information is not guaranteed as to its accuracy or completeness.
 - 2. The subsurface investigation reports are for information purposes only and are not part of the Contract Documents.
- B. Actual Conditions: Make any subsurface investigations deemed necessary to determine actual site conditions.
- C. Quality and Quantity: Make any other investigations and determinations necessary to determine the qualities and quantities of groundwater and the methods to be used to provide for the removal of water.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 INSTALLATION

- A. Water Removal: During excavation and until completion and acceptance of the Work at final inspection, provide ample means and equipment with which to remove promptly and dispose of properly the water in and entering any excavation or other parts of the Work.
1. Dewater in accordance with Technical Standard 1061, permits required for dewatering and disposal by State and local authorities having jurisdiction, and the approved Excavation Dewatering Plan.
 2. Coordinate dewatering operations with the requirements of Section 31 23 16, Section 31 23 23, Section 31 25 13, and Section 33 05 50.
 3. Perform dewatering using pipes, wells, well points, pumps, electrical generators, filters, plastic sheeting, sedimentation tanks, drain tiles, sumps, flow control devices, sand bags, surface water controls, and other appurtenances with adequate capacity and in satisfactory working condition for accomplishing the Work. Provide standby power and pumps to ensure continuous operations.
 4. Install dewatering system from the existing ground surface or from the bottom of an excavation which is located above the natural groundwater level.
 5. Place the dewatering system into operation and lower the water level prior to excavation.
 6. Keep the excavation dry.
 7. Allow no water to rise over or come in contact with masonry and concrete until the concrete and mortar have attained a set and, in any event, not sooner than 12 hours after placing the masonry or concrete.
 8. If well points or wells are used, adequately space them to provide the dewatering and sandpack the wells or use other means to prevent pumping of fine sands or silts from the subsurface. Maintain a continual check to ensure that the subsurface soil is not being removed by the dewatering operation.
 9. Open-sump pumping that leads to loss of fines, soil piping, subgrade softening, or slope instability is not acceptable.
 10. Prevent surface water and subsurface water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding

areas. Construct temporary water conveyance systems such as ditches, dams, berms, siltation ponds, site grading, sumps, and similar items to divert, collect, treat, or remove surface water from excavations and Work areas on-site.

11. At no time during construction affect existing surface or subsurface drainage patterns of adjacent property, or constrict or interrupt existing drainage courses.
 12. Prevent destabilization, heaving, and shear failure of bottom of excavation. Prevent the loss of fines, seepage, boils, quick conditions or softening of the foundation strata while maintaining stability of the sides and bottom of the excavation.
 13. Operate the dewatering system continuously 24 hours per day, 7 days per week, including holidays and during periods of work stoppages, until backfilling to final grade has been completed in the dewatering area. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on a continuous basis if part of the system becomes inadequate or fails. Observe and maintain the dewatering operation to ensure satisfactory performance. When required by State or local authorities having jurisdiction, provide continuous, 24-hour per day, 7-day per week on-site monitoring by a competent person.
 14. Conduct the dewatering operations in a manner which will protect adjacent structures, utilities, and other facilities and avoid settlement or subsidence. Where structures or facilities exist adjacent to areas of proposed dewatering, establish reference points and observe such at frequent intervals to detect settlement.
- B. Discharge of Water: Dispose of water pumped or drained from the Work in a safe and suitable manner and in accordance with applicable State and local laws and regulations without damage to adjacent property or streets or to other Work under construction.
1. Do not discharge water through the pipeline under construction.
 2. If required as a condition of applicable permit or by applicable law, ordinance or code, provide meters to measure the flow discharged. If required, analyze or treat the water to meet regulations prior to discharge. Routinely remove solids from treatment facilities and perform other maintenance.
 3. Discharge water in a manner that will not cause erosion or flooding, or worsen flooding during storm events.
 4. Water Courses: If discharging to water course, prevent erosion of banks.

5. Protection: Provide adequate protection for water discharged onto streets. Protect the street surface at the point of discharge.
 6. Sanitary Sewers: Discharge no water into sanitary sewers unless required by the applicable State and local laws and regulations. If required, discharge water in accordance with applicable State and local laws and regulations.
 7. Storm Sewers: Discharge water in accordance with applicable State and local laws and regulations. Discharge no water containing settleable solids into storm sewers.
- C. Dewatering in Agricultural Areas: Provide dewatering within agricultural areas in accordance with Section 01 41 00.
- D. Backfilling and Restoration: Remove dewatering system from site upon completion of dewatering. Plug or fill well holes or cut off and cap wells a minimum of 36 inches below grade. Backfill excavations made as part of dewatering operations in accordance with Section 31 23 23, and provide surface restoration in accordance with Division 32 and as shown.
- E. Repair: Promptly repair any damage caused by dewatering the Work.

END OF SECTION

SECTION 31 23 23

BACKFILLING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Backfilling excavation to the original surface of the ground or to such other grades as may be shown or required. For non-agricultural areas to be covered by topsoil, leave or stop backfill 8 inches below the finished grade. For agricultural areas to be covered by topsoil, leave or stop backfill 36 inches below the finished grade. Obtain approval before backfilling against masonry structures. Remove from backfill, any compressible, putrescible, or destructible rubbish and refuse and lumber and braces from the excavated space before backfilling is started. Refer to Section 01 41 00 for backfilling requirements in wetland, waterway, and agricultural areas.
- B. Equipment Limitations: Do not permit construction equipment used to backfill to travel against and over cast-in-place concrete structures until the specified concrete strength has been obtained, as verified by concrete test cylinders. In special cases where conditions warrant, the above restriction may be modified providing the concrete has gained sufficient strength, as determined from test cylinders, to satisfy design requirements for the removal of forms and the application of load. Do not use equipment that will cause rutting of the surface in designated seeding areas located within wetland and waterway areas.
- C. Related Work Specified In Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 01 41 00 - Regulatory and Special Requirements
 - 2. Section 31 10 00 - Site Clearing
 - 3. Section 31 23 16 - Excavation
 - 4. Section 31 41 00 - Shoring, Sheet piling and Bracing

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ACI 305R - Hot Weather Concreting
 - 2. ACI 306R - Cold Weather Concreting
 - 3. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

4. ASTM C94 - Standard Specification for Ready-Mixed Concrete
5. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete
6. ASTM C150 - Standard Specification for Portland Cement
7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
8. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
9. ASTM D4832 - Standard Test Method for Preparation and Testing of Controlled Low Strength (CLSM) Test Cylinders
10. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, including the supplemental specifications and recurring special provisions, referred to as the "State Specifications"
11. Standard Specifications for Sewer and Water Construction in Wisconsin, referred to as the "Standard Specifications"

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Product Data and Information:
 1. Source of backfill material.
 2. Flowable fill mix design.
 3. Geotextile fabric product data.
 4. Class D concrete mix design.
- C. Quality Control:
 1. Certified laboratory reports of proposed pipe bedding and backfill material, including unit weight, specific gravity, soundness and gradations of proposed granular backfill material.
 2. Class D concrete testing results.

1.4 FIELD CONDITIONS

- A. Reconstruct riprap damaged by pipeline construction in accordance with the requirements of the authority having jurisdiction and Section 606 of the State Specifications.

PART 2 PRODUCTS

2.1 BACKFILL MATERIAL - GENERAL

- A. General: Backfill with sound materials, free from waste, organic matter, rubbish, boggy or other unsuitable materials.
- B. General Materials Requirements: Conform materials used for backfilling to the requirements specified. Follow common fill requirements whenever other fill is not specified. Determine and obtain the approval of the appropriate test method where more than one compaction test method is specified.
- C. Frozen Materials: Do not use frozen material for backfilling.

2.2 BACKFILL MATERIAL - WETLAND, WATERWAY, AND AGRICULTURAL AREAS

- A. General: Backfill trenches within wetland, waterway, and agricultural areas in accordance with Section 01 41 00.

2.3 SELECT FILL

- A. Materials for Select Fill: Provide select fill in accordance with the authority having jurisdiction. Use gravel, crushed stone, limestone screenings or other granular or similar material as approved which can be readily and thoroughly compacted to not less than 95 percent of the maximum dry density obtainable by ASTM D1557.

1. Suitable Materials for Select Fill:

- a. Grade select fill between the following limits:

U.S. Standard Sieve	Percent Passing by Weight
2 inch	100
1-1/2 inch	90-100
1 inch	75-95
1/2 inch	45-70

U.S. Standard Sieve	Percent Passing by Weight
#4	25-50
#10	15-40
#200	5-15

- b. Select fill conforming to 1 1/4-inch aggregate defined in Section 305.2.2 of the State Specifications may be used.
- c. For City of Waukesha jurisdiction, provide select fill conforming to Table 39 of Standard Specifications Section 8.43.7.

2. Unsuitable Materials for Select Fill: Very fine sand, uniformly graded sands and gravels, or other materials that have a tendency to flow under pressure when wet are unacceptable as select fill.

2.4 PIPE BEDDING

- A. Material for Pipe Bedding: Use of crushed stone chips made from crushing sound limestone, dolomite ledge rock, or other materials of regional significance, which can be readily and thoroughly compacted to 95 percent of the maximum dry density obtainable by ASTM D1557. The material is to be hard, tough, and durable.

1. Gradation for Small Piping: For pipe 18 inches and smaller in diameter, grade pipe bedding between the following limits:

Gradation Requirements for 3/8-inch Crushed Stone
(Standard Specifications, Table 32)

U.S. Standard Sieve	Percent Passing by Weight
1/2 inch	100
3/8 inch	90-100
#8	0-15
#30	0-3

2. Gradation for Large Piping: For pipe larger than 18 inches in diameter, grade pipe bedding between the following limits:

Gradation Requirements for 3/4-inch Crushed Stone
(Standard Specifications, Table 28, Coarse Aggregate Size No. 1, and Table 33)

U.S. Standard Sieve	Percent Passing by Weight
1 inch	100
3/4 inch	90-100
3/8 inch	20-55
#4	0-10
#8	0-5

2.5 FLOWABLE FILL

- A. Materials for Flowable Fill: Provide flowable fill in accordance with the authority having jurisdiction. Use a concrete mixture of aggregate, and water that is workable, flowable, compacted to 95 percent of the maximum dry density obtainable by ASTM D1557, and self-leveling meeting the requirements of Sections 8.43.8 and 8.43.9 of the Standard Specifications and ASTM D4832.
- B. Thoroughly mix the materials in a clean concrete mixer truck in the following quantities per cubic yard in damp weight.
 1. Sand: 1,350 lbs of sand.
 2. Coarse Aggregate Size No. 1: 750 lbs of Course Aggregate Size No. 1.
 3. Coarse Aggregate Size No. 2: 1,150 lbs of Coarse Aggregate Size No. 2 graded between the following limits:

Gradation Requirements for 1 1/2-inch Crushed Stone
(Standard Specifications, Table 28, Coarse Aggregate Size No. 2)

U.S. Standard Sieve	Percent Passing by Weight
2 inch	100
1 1/2 inch	90-100
1 inch	20-55
3/4 inch	0-15
1/2 inch	0-5

4. Water: 25 gallons of water. Additional water is not permitted

- C. Water: Provide batch mixing water and mixer washout water meeting the requirements of ASTM C94.
- D. Consistency: Provide fill with a consistency such that the material flows easily into voids and openings.

2.6 COMMON FILL

A. Materials for Common Fill:

1. Material used as common fill is subject to approval.
2. Material from on-site excavation may be used as common fill provided that it can be readily compacted to 90 percent of the maximum dry density obtainable by ASTM D1557, and does not contain unsuitable material as defined below.
3. If there is insufficient suitable material from on-site excavation, then import additional off-site material from sources other than the excavations in this contract conforming to the specifications and at no additional cost. Select fill may be used as common fill at no change in the Contract Price.

B. Suitable Soils for Common Fill: ASTM D2487 soil classification group (Unified Soil Classification System) GW, GP, GM, GC, SW, SP, SM, SC, CL, ML, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsuitable Soils for Common Fill: ASTM D2487 soil classification group CH, MH, OH, OL and PT; soils which contain rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation or other organic matter, pieces or fragments of concrete larger than 3 inches in any dimension, clumps of clay larger than 6 inches in any dimension, and other deleterious matter.

2.7 CLASS D CONCRETE

- A. Use Class D concrete at existing utility crossing, pipe encasement, blow-off outlet, and valve pad as shown.
- B. Provide Class D concrete in accordance with Table 29 of the Standard Specifications and meeting the requirements of Section 8.35.0 of the Standard Specifications.

2.8 GEOTEXTILE FABRIC

- A. Provide non-woven, permeable, synthetic fiber material designed to prevent fine soil particles from migrating through the material. Provide geotextile filter fabric in accordance with Section 645 of the State Specifications.

PART 3 EXECUTION

3.1 ELECTRICAL CONDUIT AND VAULT BEDDING

- A. **Bedding Compaction:** Bed electrical conduits and vaults in well graded, compacted, select fill conforming to the requirements of this Section except as otherwise shown, specified, or required. Where conduit is installed in dedicated trenches, extend electrical conduit bedding a minimum of 6 inches below the bottom of the conduit and above the top of the conduit for the full trench width. Compact bedding thickness no less than 6 inches for vault bases.
- B. **Concrete Work Mats:** Cast cast-in-place vault bases and other foundations for structures against a Class D concrete work mat in clean and dry excavations, unless otherwise shown, specified or required.
- C. **Bedding Placement:** Place select fill used for bedding beneath electrical conduits and vault bases in uniform layers not greater than 9 inches in loose thickness on native, undisturbed soil. Thoroughly compact in place with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

3.2 PIPE BEDDING

- A. **General:** Provide pipe bedding material as specified and shown to proper grade and elevation and for the full width of the trench.
- B. **Hand Placement:** Place pipe bedding by hand from the bottom of the excavation on native, undisturbed soil to 1 foot over the top outside surface of the pipe in uniform layers not greater than 6 inches in loose thickness. Tamp under pipe haunches and thoroughly compact pipe bedding in place with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as measured by ASTM D1557.
- C. **Stone Placement:** Do not place stone fragments 3 inches or larger in any dimension in the backfill nearer than 2 feet at any point from any pipe, conduit or concrete wall.
- D. **Unallowed Materials:** Pipe bedding containing very fine sand, uniformly graded sands and gravels, or other materials that have a tendency to flow under pressure when wet is unacceptable.

3.3 GEOTEXTILE FABRIC

- A. Provide geotextile fabric as shown and as follows:
 - 1. Anywhere loose silt, soft clay, or organic soils are encountered.
 - 2. If trench excavation is in unsuitable soils that extend to and above the trench bottom.
 - 3. Where directed by the RESIDENT PROJECT REPRESENTATIVE.
- B. Protect geotextile fabric during storage from becoming wet, coming in contact with soil, cement, or other foreign materials, and from exposure to sunlight.
- C. Where geotextile fabric is required to envelop pipe bedding:
 - 1. Lay geotextile fabric along the bottom of the trench and pull up along the side walls of the trench prior to placement of pipe bedding material. Take care to allow the geotextile fabric to conform to the full extent of the trench opening so as to prevent tearing of the geotextile fabric during pipe bedding placement.
 - 2. Keep sufficient geotextile fabric on each side of the trench to allow the geotextile fabric to be folded over and placed on top of the fully installed pipe bedding material and overlapped linearly along the pipeline as shown.
 - 3. Place small quantities of the flowable fill, select fill, or common fill material as shown on the geotextile fabric to keep the fabric and overlap in place.

3.4 EXISTING UNDERGROUND STRUCTURES AND UTILITIES

- A. Bed and backfill existing underground structures, tunnels, conduit, or pipe crossing the excavation as shown. Place bedding material under and around each existing underground structure, tunnel, conduit, or pipe and extend underneath to native, undisturbed soil and on each side to a distance equal to the depth of the trench below the structure, conduit or pipe or width of the trench, whichever is greater.

3.5 BEDDING PLACEMENT AND BACKFILL FOR PIPE IN SHORT TUNNEL

- A. Bed pipelines or electrical conduits placed in short tunnels in select fill or Class D concrete. Completely fill the remainder of the annular space between the outside of the pipe wall and the tunnel wall with select fill, suitable job-excavated material, or Class D concrete, as approved. Suitably support pipelines or conduits in short tunnels to permit placing of backfill suitably tamped in place.

3.6 TRENCH BACKFILL - GENERAL

- A. General: Backfill trenches from 1 foot over the top of the pipe, from the top of electrical conduit bedding or as shown to the bottom of pavement base course, subgrade for lawns or lawn replacement, to the top of the existing ground surface or to such other grades as may be shown or required.
- B. Backfill simultaneously and evenly on each side of free-standing structures and pipe.
- C. Materials: Provide flowable fill, select fill, or common fill, as shown, specified and approved for trench backfill.
- D. Depth of Placement - General: Except under pavements, walkways, railroad tracks, and street or highway appurtenances, or as otherwise shown or specified, place trench backfill in uniform layers not greater than 9 inches in loose thickness and thoroughly compact in place using suitable mechanical or pneumatic equipment. Compact backfill to not less than 90 percent of the maximum dry density as determined by ASTM D1557.
- E. Depth of Placement - Traffic Areas and Under Utilities: Where pavements, walkways, railroad tracks, and street or highway appurtenances are to be placed over trenches (except in tunnels) and under utilities or utility services crossing the trench, provide trench backfill as shown. Compact backfill to not less than 95 percent of the maximum dry density as determined by ASTM D1557. Place select fill, and flowable fill as follows.
 - 1. Placing Select Fill:
 - a. Provide select fill in uniform layers not greater than 9 inches in loose thickness and thoroughly compacted in place with equipment as specified in this Section.
 - 2. Placing Flowable Fill:
 - a. Just prior to mixing, run the mixer at full mixing speed for one full minute to provide an even mixture.
 - b. Place fill directly from the concrete transit mix truck over the pipe bedding material to an elevation equal to the bottom of pavement base course as shown.
 - c. Use rodding, mechanical vibration, and compaction to assist in consolidating the fill to fill voids and openings.
 - d. When required to prevent uplift, place fill in 2 stages, allowing sufficient time for the initial set of the first stage before the remainder is placed.

- e. At air temperatures lower than 45 degrees Fahrenheit, deliver and place fill at a minimum temperature of 50 degrees Fahrenheit. Maintain a temperature of flowable fill during production and transportation equal to or less than 90 degrees Fahrenheit.
 - f. Do not place fill when:
 - (1) The trench walls are frozen or contain frozen materials.
 - (2) The air temperature is below 40 degrees Fahrenheit, unless the air temperature is 35 degrees Fahrenheit or more and the temperature is rising.
 - (3) Weather conditions are otherwise unsuitable.
 - (4) Directed by the RESIDENT PROJECT REPRESENTATIVE.
 - F. Depth of Placement - Undeveloped Areas: In undeveloped areas where flowable or select fill material or hand-placed backfill are not specified, shown, or required, place common fill, or other approved backfill in lifts not exceeding 12 inches in loose thickness. When the trench is full, consolidate the backfill by jetting, spading, tamping or puddling to ensure complete filling of the excavation. Mound the top of the trench approximately 12 inches to allow for consolidation of backfill.
 - G. Dropping of Material on Work: Do trench backfilling Work in such a way as to prevent dropping material directly on top of any conduit or pipe through any great vertical distance that would cause damage to the pipe, coating, polyethylene encasement, any other aspect of the Work, or existing utility or structure. Do not allow backfilling material from a bucket or other source to fall directly on a structure or pipe and lower the bucket or other source so that the shock of falling earth will not cause damage.
 - H. Distribution of Large Materials: Break lumps up and distribute any stones, pieces of crushed rock or lumps which cannot be readily broken up, throughout the mass so that interstices are solidly filled with fine material.
- 3.7 TRENCH BACKFILL - WETLAND, WATERWAY, AND AGRICULTURAL AREAS
- A. General: Backfill trenches within wetland, waterway, and agricultural areas in accordance with Section 01 41 00.
- 3.8 STRUCTURE BACKFILL
- A. Use of Select Fill: Use select fill underneath structures, and adjacent to structures where pipes, connections, electrical ducts and conduits, and structural foundations are to be located within this fill. Use flowable fill or select fill beneath pavements,

walkways, and railroad tracks (except in tunnels) as shown and extend up to the bottom of pavement base course or ballast.

1. Place backfill in uniform layers not greater than 8 inches in loose thickness and thoroughly compact in place with suitable approved mechanical or pneumatic equipment.
 2. Compact backfill to not less than 95 percent of the maximum dry density as determined by ASTM D1557.
- B. Use of Common Fill: Use common fill adjacent to structures in areas not specified above, unless otherwise shown or specified. Select fill may be used in place of common fill at no additional cost.
1. Extend such backfill from the bottom of the excavation or top of bedding to the bottom of subgrade for lawns or lawn replacement, the top of previously existing ground surface or to such other grades as may be shown or required.
 2. Place backfill in uniform layers not greater than 8 inches in loose thickness and thoroughly compact in place with suitable equipment, as specified above.
 3. Compact backfill to not less than 90 percent of the maximum dry density as determined by ASTM D1557.
- C. Use of Clay: In unpaved areas adjacent to structures for the top 1 foot of fill directly under lawn subgrades use clay backfill placed in 6-inch lifts. Compact clay backfill to not less than 90 percent of the maximum dry density as determined by ASTM D1557.
1. Use clay having a liquid limit less than or equal to 40 and a plasticity index less than or equal to 20.

3.9 CLASS D CONCRETE

A. Placement:

1. Place Class D concrete only in the presence of the RESIDENT PROJECT REPRESENTATIVE.
2. Continuous Operation: Place no concrete after its initial set has occurred, and do not use re-tempered concrete under any condition.
3. Minimum Handling: Convey and place concrete with minimum handling and deposit the concrete in the forms as close as possible to its final position and in no case more than 5 feet in a horizontal direction therefrom. Do not re-handle concrete.

4. Horizontal Layers: Place concrete in horizontal layers shallow enough so that the previous layer is still soft when the next layer is added and the two layers can be vibrated together. Do not exceed 18 inches in depth for each layer.
 5. Protection Against Elements: Protect freshly placed exposed concrete against damage from the elements or other sources.
 6. Hot Weather Placement: For placement of concrete during hot weather, follow the recommendations of ACI 305R.
 7. Cold Weather Placement: For placement of concrete during cold weather, follow the recommendations of ACI 306R, except that set-accelerators will not be permitted.
- B. Testing: Perform testing of Class D concrete in accordance with Section 8.35.2 of the Standard Specifications.
- C. Low Concrete Strength Test Results:
1. Compressive Strength: Designate the 28-day strength as f'_c .
 2. Test Cores: If it is determined that the serviceability of the concrete is significantly reduced by low concrete strength test results, take test cores from the area in question. Drill and test cores in accordance with ASTM C42 except as otherwise noted. Take three cores for each strength test more than 500 psi below the specified f'_c .
 3. Acceptable Levels of Strength: Concrete in the area represented by core tests will be accepted if the average of three cores is equal to or greater than $0.85 f'_c$ and no single core is less than $0.75 f'_c$.
 4. Unacceptable Concrete: Remove and replace concrete which does not meet the core test requirements or strengthen the concrete to the satisfaction of the RESIDENT PROJECT REPRESENTATIVE.

3.10 COMPACTION EQUIPMENT

- A. Equipment and Methods: Carry out compaction with suitable approved equipment and methods.
1. Compact clay and other cohesive material with sheep's-foot rollers or similar equipment where practicable. Use hand held pneumatic tampers elsewhere for compaction of cohesive fill material.

2. Compact low cohesive soils with pneumatic-tire rollers or large vibratory equipment where practicable. Use small vibratory equipment elsewhere for compaction of cohesionless fill material.
3. Do not use heavy compaction equipment over pipelines or other structures, unless the depth of fill is sufficient to adequately distribute the load.

3.11 FINISH GRADING

- A. Final Contours: Perform finish grading in accordance with the completed contour elevations and grades shown and blend into conformation with remaining natural ground surfaces.
 1. Leave finished grading surfaces smooth and firm to drain.
 2. Bring finish grades to elevations within plus or minus 0.10 foot of elevations or contours shown.
- B. Surface Drainage: Perform grading outside of building or structure lines in a manner to prevent accumulation of water within the area. Where necessary or where shown, extend finish grading to ensure that water will be carried to drainage ditches, and the site area left smooth and free from depressions holding water.

3.12 RESPONSIBILITY FOR AFTERSETTLEMENT

- A. Aftersettlement Responsibility - General: Take responsibility for correcting any depression which may develop in backfilled areas from settlement within one year after the Work is fully completed. Provide as needed, backfill material, pavement base replacement, permanent pavement, sidewalk, curb and driveway repair or replacement, and lawn replacement, and perform the necessary reconditioning and restoration Work to bring such depressed areas to proper grade as approved.
- B. Aftersettlement Responsibility - Wetland, Waterway, and Agricultural Areas: Take responsibility for correcting any depression which may develop in backfilled wetland, waterway, and agricultural areas in accordance with Section 01 41 00.

3.13 INSPECTION AND TESTING OF BACKFILLING

- A. Sampling and Testing: Sampling and testing of in-place backfill and concrete will be provided by the OWNER as specified in Division 1. If initial testing reveals non-compliance with Contract requirements, additional testing will be made at the Contractor's expense.
- B. Coordinate required backfill and concrete tests with the OWNER's testing agency including providing the testing agency a 24-hour notice prior to any required testing.

- C. Correction of Work: Correct any areas of unsatisfactory compaction by removal and replacement, or by scarifying, aerating or sprinkling as needed and recompaction and retesting in place prior to placement of a new lift at no cost to OWNER.

END OF SECTION

SECTION 31 25 13

EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: The requirements for providing slope protection and erosion and control practices for all areas within the contract limits and other areas indicated, including work designated in permits and other agreements, as shown, and as specified. Provide additional erosion and sediment control materials and methods required by state or local ordinances, whichever is more stringent. Refer to Section 01 41 00 for erosion and sediment control requirements in wetland, waterway, and agricultural areas.
- B. Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 01 41 00 - Regulatory and Special Requirements
 - 2. Section 31 10 00 - Site Clearing
 - 3. Section 31 23 16 - Excavation
 - 4. Section 31 23 23 - Backfilling
 - 5. Section 32 90 00 - Landscaping Work
 - 6. Section 33 05 23 - Jacking, Augering and Mining

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ASTM (American Society of Testing and Materials)
 - a. D4355 – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
 - b. D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity
 - c. D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
 - d. D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile

- e. D4833 – Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
2. State of Wisconsin Department of Natural Resources – Conservation Practice Standards (WDNR - CPS);
- a. Non-Channel Erosion Mat: WDNR – CPS 1052
 - b. Channel Erosion Mat: WDNR – CPS 1053
 - c. Sediment Bale Barrier (Non-Channel): WDNR – CPS 1055
 - d. Silt Fence: WDNR – CPS 1056
 - e. Trackout Control Practices: WDNR – CPS 1057
 - f. Mulching for Construction Sites: WDNR – CPS 1058
 - g. Seeding for Construction Site Erosion Control: WDNR – CPS 1059
 - h. Storm Drain Inlet Protection for Construction Sites: WDNR – CPS 1060
 - i. Ditch Check (Channel): WDNR – CPS 1062
 - j. Sediment Trap: WDNR – CPS 1063
 - k. Sediment Basin: WDNR – CPS 1064
 - l. Construction Site Diversion: WDNR – CPS 1066
 - m. Temporary Grading Practices for Erosion Control (Surface Roughening and Temporary Ditch Sumps): WDNR – CPS 1067.
 - n. Dust Control on Construction Sites: WDNR – CPS 1068
3. State of Wisconsin Department of Transportation (WisDOT):
- a. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, including the supplemental specifications and recurring special provisions, referred to as the “State Specifications”
 - b. Erosion Control Product Acceptability Lists for Multi-Modal Applications (PAL), referred to as the “WisDOT PAL”
4. Federal, State and local laws and regulations applying to the design and construction of slope protection and erosion and sediment control.

- a. Waukesha County Storm Water Management and Erosion Control Program Late Season Stabilization Requirements
- 5. U.S. Environmental Protection Agency (USEPA):
 - a. Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites.
http://www.epa.gov/npdes/pubs/sw_swppp_guide.pdf

1.3 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1.
 - 1. Shop Drawings:
 - a. Erosion and Sediment Control Plan: An Erosion and Sediment Control Plan conforming to the requirements of the Federal, State and local authority having jurisdiction indicating proposed methods, materials, and schedule for effecting erosion and siltation control to prevent erosion damage to site and adjacent areas.
 - b. Inlet protection fiber material.
 - c. Submittals to WDNR, including the following, as specified:
 - a. Section 404/401 Wetland Permit Application
 - b. Exclusion fencing product data
 - c. The Required and Recommended Measures of sediment and erosion control
 - 2. Quality Control:
 - a. For Non-Channel and Channel Erosion Matting, provide documentation of materials used, monitoring logs, project diary, and weekly inspection forms including erosion and stormwater management plans.
- B. Submit copies of all required permits to the RESIDENT PROJECT REPRESENTATIVE before performing any work.

1.4 REGULATORY REQUIREMENTS

- A. Comply with Federal, State and local laws and regulations governing slope protection and erosion and siltation on construction sites. Obtain necessary Federal,

State, and local permits for slope protection and erosion and siltation on construction sites.

B. Permit

1. Apply for, pay fee, and obtain State and local stormwater discharge permits.
2. Prepare construction site erosion control plan, Consolidated Permit form, and submit form and current fee to Wisconsin Department of Natural Resources.
3. Prepare and submit necessary site erosion control plans and fees for local permits.
4. At completion of construction activity, file a Notice of Termination.

PART 2 PRODUCTS

2.1 MATERIALS

A. Non-Channel and Channel Erosion Matting: Provide Non-Channel and Channel Erosion Matting meeting the requirements of WDNR CPS 1052 and 1053.

1. Provide erosion mat products identified on the WisDOT PAL.
 - a. Select the appropriate erosion mat based on site specific slope and slope length conditions in accordance with the WisDOT Facilities Development Manual (FDM Section 10-5) Slope Erosion Control Matrix and Channel Erosion Control Matrix.
2. Provide mats with specific qualities for environmentally sensitive areas:
 - a. Select mats composed exclusively of organic materials for work in or near waterways or other sensitive areas.
 - b. Select mats that contain biodegradable thread with the “leno” or “gauze” weave that contains strands that can move independently for work in or near areas where endangered species or endangered habitats are known to be present and in accordance with Section 01 41 00.

B. Amphibian and Reptile Exclusion Fencing: Provide Amphibian and Reptile Exclusion Fencing meeting requirements of the WDNR Amphibian and Reptile Exclusion Fencing Protocol, as referenced in Section 01 41 00.

C. Sediment Bale Barrier (Non-Channel): Provide Sediment Bale Barriers (Non-Channel) meeting the requirements of WDNR – CPS 1055.

1. Erosion Bales: Tightly compacted bales of grain straw, hay, or other suitable material with approximate dimensions of 14 inches high, 18 inches deep, and 36 inches long, secured by a minimum of two strings.
- D. Silt Fence: Provide Silt Fences meeting the requirements of WDNR – CPS 1056.
 1. Provide temporary silt fencing designed to intercept and slow the flow of sediment-laden sheet flow runoff from areas of disturbed soil.
- E. Stone Tracking Pad, Manufactured Trackout Control Devices, and Tire Washing: Provide Stone Tracking Pads, Manufactured Trackout Devices, and Tire Wash Racks meeting the requirements of WDNR – CPS 1057.
- F. Soil Stabilizers: Provide Soil Stabilization meeting the requirements of the WisDOT PAL.
- G. Mulching for Construction Sites: Provide Mulching for Construction Sites meeting the requirements of WDNR – CPS 1058.
- H. Seeding for Construction Site Erosion Control: Provide Seeding for Construction Site Erosion Control meeting the requirements of WDNR – CPS 1059.
 1. Seed Selection:
 - a. Select seed meeting the requirements of WDNR - CPS 1059.
 2. Seed Rates:
 - a. Temporary Seeding (Cover Crop):
 - (1) Provide seed rates for temporary seeding meeting the requirements of WDNR - CPS 1059.
 - b. Permanent Seeding:
 - (1) Refer to Section 32 90 00 for permanent seeding.
- I. Storm Drain Inlet Protection for Construction Sites: Provide Storm Drain Inlet Protection for Construction Sites meeting the requirements of WDNR – CPS 1060.
 1. Materials:
 - a. Fabric Material: Provide Type FF, woven polypropylene as specified in the WisDOT PAL.
 2. Provide inlet protection systems as follows:

- a. Type A around field inlets until permanent stabilization methods have been established. Use Type A inlet protection on pavement inlets prior to installation of curb and gutter or pavement.
 - b. Type B on street inlets without curb head, once surrounding surfaces are in place.
 - c. Type C on street inlets with curb heads. Provide a 2 inch x 4 inch minimum, piece of wood and wrap and attach fabric to wood. Place wood blocking and fabric over inlet with wood straddling inlet opening a minimum of 8 inches in each direction. Secure 2 x 4 inch board to grate with wire or plastic ties. Verify and secure wood blocking to rest on inlet grate and that fabric covers remaining curb head opening. Do not block entire inlet curb opening with wood blocking.
 - d. Type D in areas where other types of inlet protection are identified as incompatible with roadway and traffic conditions causing possible safety hazards when water ponding occurs at the inlet. Provide inlet protection as shown.
- 3. Use manufactured bags, such as sand bags used as inlet protection devices conforming to the following minimum criteria:
 - a. Minimum Size: 14 x 26 inches.
 - b. Grab Tensile Strength of Fabric: 95 pounds minimum in accordance with ASTM D4632.
 - c. UV Stability: 70 percent minimum in accordance with ASTM D4355.
 - d. Sew fabric together with double stitching to provide sufficient strength where necessary.
- J. Ditch Check - Channel: Provide Ditch Checks in Channels meeting the requirements of WDNR – CPS 1062.
 - 1. Provide temporary swale or ditch dam to reduce velocity of flowing water at locations shown.
 - 2. Stone Ditch Checks:
 - a. Provide additional stability, recess rock into soil to a depth of 6 inches. Place geotextile fabric in recess and set rock into place.

- b. Constructed of well-graded angular rock, a mass medium diameter, or D50, of 3 inch or greater, sometimes referred to as breaker run or shot rock.

3. Sediment Logs:

- a. Provide sediment logs fabricated from compacted geotextiles, wood excelsior, coconut fibers, hardwood mulch or a mixture of these materials within flexible tubular netting and accessories related to sediment log fabrication.
- b. Manufacturers: Manufacturers of equivalent products may be submitted.
 - (1) American Excelsior Company.
 - (2) Tensar International – North American Green.
 - (3) Ro Lanka International.
 - (4) Western Excelsior Corporation.
 - (5) Approved Equal.

4. Sediment Wattles:

- a. Provide sediment wattles fabricated from seed-free straw or coconut husk fiber encased in flexible tubular netting with required accessories.
- b. Manufacturers: Manufacturers of equivalent products may be submitted.
 - (1) American Excelsior Company.
 - (2) Tensar International – North American Green.
 - (3) Ro Lanka International.

- 5. Provide non-woven geotextile fabric under ditch check materials for easy installation and removal.

K. Sediment Basin (Temporary): Provide Temporary Sediment Basins meeting the requirements of WDNR – CPS 1064.

- 1. Provide a temporary sediment basin in areas of concentrated flow or points of discharge during construction.

2. Determine the sediment pond size based upon anticipated runoff amounts and sediment type.
 3. Size surface treatment area of the sediment basin based on the texture of the soil entering the basin and the peak outflow during the 1-year, 24-hour design storm.
 4. Construct the sediment basin so that the depth below the treatment surface area as measured from the invert of the lowest outlet of the sediment basin to be a minimum of 5 feet deep, (2 feet for sediment storage plus 3 feet to protect against scour/resuspension and a maximum of 10 feet deep to limit the potential for thermal stratification.
 5. Construct the interior side slopes below the lowest invert to be 2:1 (horizontal: vertical) or flatter to maintain soil stability.
 6. Determine the active storage volume above the treatment surface area.
 7. Design the earthen embankments to address potential risk and structural integrity issues such as seepage and saturation.
- L. Sediment Trap: Provide Sediment Traps meeting the requirements of WDNR – CPS 1063.
- M. Construction Site Diversion: Provide Construction Site Diversions meeting the requirements of WDNR – CPS 1066.
1. Provide temporary berms and channels as shown and specified.
- N. Temporary Grading Practices for Erosion Control: Provide Temporary Grading Practices for Erosion Control meeting the requirements of WDNR – CPS 1067.
- O. Dust Control on Construction Sites: Provide Dust Control on Construction Sites meeting requirements of WDNR – CPS 1068.
- P. Cofferdam:
1. Provide cofferdams as a temporary work measure when work is conducted in a waterway (stream, river, or other linear feature that conveys water). Intercept water upstream and discharge it downstream or divert it around the job site. Provide the appropriate cofferdam for the temporary stream diversion as follows:
 - a. Bladderdam: In conditions where there is a relatively flat base material.
 - b. A-frame: In conditions where there is a relatively flat base material.

- c. Stone and Impermeable Barriers: In intermittent streams of lower flow velocity and in the presence of uneven, stone, or bedrock base material. The impermeable barrier should consist of one of the following materials:
 - (1) Rubber liner with a thickness of at least 45 millimeters and a solvent weld to affix the material into larger sections.
 - (2) Polypropylene liner with a thickness of at least 40 millimeters and a heat gun to weld pieces together.
 - (3) Polyvinyl chloride (PVC) liner with a thickness of at least 40 millimeters and a solvent weld to affix material into larger sections.
 - d. Steel Sheet: Do not use in areas where underground utility service lines may be present.
- 2. Provide cofferdams of nonerrodible materials such as stone, metal, geosynthetics, or other products as approved by the RESIDENT PROJECT REPRESENTATIVE, free of potential pollutants such as soil, silt, sand, clay, grease, or oil. Provide materials that are nontoxic and non-hazardous. Provide material used to minimize seepage underneath diversion structures as close to neutral pH (7) as possible.
 - 3. Any alternative cofferdam must be approved by the RESIDENT PROJECT REPRESENTATIVE and comply with approved State stormwater discharge permits, Erosion and Sediment Control Plan, construction site erosion control plan, and Consolidated Permit form.

PART 3 EXECUTION

3.1 EROSION AND SEDIMENT CONTROL PLAN

- A. General: Prepare an Erosion and Sediment Control Plan to include erosion control practices conforming to the requirements of the Federal, State and local authority having jurisdiction. Include the following in the plan:
 - 1. Total square area disturbed by excavation.
 - 2. Proposed method and quantity of erosion control practices to be provided. For instance, feet of vegetative control, feet of interceptor ditches, feet of berms, cubic feet of silt traps. Include an erosion plan scale of 1 inch equals 40 feet, indicating location of erosion control materials, siltation basins, etc.

3. Approximate square feet of area controlled by the erosion control practices as specified in the Erosion and Sediment Control Plan, and the type of erosion control practices, whether permanent or temporary.
 4. Topographical or plan maps of construction area with areas marked to indicate erosion control practices used.
 5. Drainage area, including construction site.
 6. Area of construction site in acres that fall in the following slope categories:
 - a. 0-2 percent slope
 - b. 3-4 percent slope
 - c. 4-6 percent slope
 - d. 6 percent and storm slope
 7. A summary of the disposition of the collected sediment from the slope areas listed in Item 6.
 8. Schedule for implementation of plan.
 9. Provision for maintenance and upkeep of erosion control and siltation materials, identifying persons responsible for said maintenance.
- B. Availability: Keep the Erosion and Sediment Control Plan at the construction site at all times available for inspection for the entire construction period.
- C. Ordinances: Comply with all erosion and siltation control ordinances in effect and required by governing bodies having jurisdiction over the construction site and provide appropriate control measures as required.

3.2 GENERAL

- A. Provide necessary precautions and facilities to protect indicated areas within the Contract limits from discharges resulting from construction operations, excessive erosion runoff of the construction site, silting and any other contamination resulting from construction work. Provide erosion control practices conforming to the specified requirements and to include but not limited to the following provisions:
1. Place erosion and siltation control measures prior to or as the first step in grading.
 2. Keep disturbed area small.

3. Stabilize disturbed areas with mechanical or structural and vegetative methods.
4. Keep runoff low through use of short slopes, low gradients, and the preservation of natural vegetative cover.
5. Protect disturbed areas from stormwater runoff.
6. Retain sediment within site boundaries.
7. Restore surfaces at trenches not in streets within 15 days after backfill.
8. Place excavated material on the uphill side of trenches where possible. Do not place materials in stream beds. Seed any stockpiled material which remains in place longer than thirty days with temporary vegetation and mulch.
9. Mulch and seed temporary earth berms, diversions, erosion barriers and temporary stockpiles with temporary vegetative cover within 10 days after grading.
10. Do not stockpile or otherwise place dredged, excavated or other material, at any time, in or near a stream bed which may increase the turbidity of the water. If turbidity producing materials are present, hold surface drainage from cuts and fills within the construction limits and from borrow and waste disposal areas in suitable sedimentation ponds or grade surface drainage to control erosion within acceptable limits. Provide and maintain temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, until permanent drainage and erosion control facilities are completed and operative. Hold to a minimum the area of bare soil exposed at any one time by construction operations.
11. Drain wet dredged material for a minimum of 7 days. Store the material for drainage to a maximum height of 4 feet.
12. Provide temporary erosion and sediment control measures to include but not be limited to the following:
 - a. Installation (and ultimate removal) of silt screens.
 - b. Straw bales and silt traps around construction areas for all required structures.
 - c. Diked area with earth berm and silt trap for draining dredged material.
 - d. Straw bales with silt traps along top of slope of fill area plus seeding and mulching of entire fill area not otherwise protected.

3.3 INSTALLATION

- A. Non-Channel and Channel Erosion Matting: Provide Non-Channel and Channel Erosion Matting meeting the requirements of WDNR CPS 1052 and 1053.
- B. Sediment Bale Barrier (Non-Channel): Provide Sediment Bale Barriers (Non-Channel) meeting the requirements of WDNR – CPS 1055.
 - 1. Sediment Bale Barrier; (Hay or Straw)
 - a. Place bales end to end across ditches or other location as shown.
 - b. Place bales at right angles to direction of water flow with bandings oriented around sides.
 - c. Tightly abut ends of bales and fill gaps between bales with bale material wedged in.
 - d. Embed straw bales a minimum 4 inches into ground.
 - e. Securely anchor bales with at least two wood or steel stakes driven a minimum 12 inches into ground.
 - f. Place bales such that one full bale length on either side of drainage way is above anticipated flow line.
 - g. Where heavy flows are anticipated, supplement bales with a filter fabric fence installed on downstream side of bales.
- C. Silt Fence: Provide Silt Fences meeting the requirements of WDNR – CPS 1056.
- D. Trackout Control Practices: Prevent, reduce, or mitigate trackout of sediment in accordance with WDNR – CPS 1057.
 - 1. Install one of the following practices, or a combination of practices, in accordance with WDNR – CPS 1057. Trackout is best managed by implementing controls in the order below. These controls may be implemented in series where conditions warrant.
 - a. Prevent trackout with stabilized work surfaces and reduced vehicle contact with soil
 - b. Reduce trackout with stone tracking pad, manufactured trackout control devices, or tire washing
 - c. Mitigate trackout with street cleaning

- E. Soil Stabilizers: Provide Soil Stabilizers meeting the requirements of the WisDOT PAL.
- F. Mulching for Construction Sites: Provide Mulching for Construction Sites meeting the requirements of WDNR – CPS 1058.
- G. Seeding for Construction Site Erosion Control: Provide the Seeding for Construction Site Erosion Control meeting the requirements of WDNR – CPS 1059.
 - 1. Perform site assessment to evaluate soil characteristics, topography, exposure to sunlight, proximity to natural plant communities, proximity to nuisance, noxious and invasive species, site history, moisture regime, climatic patterns, soil fertility, and previous herbicide applications prior to commencing any seeding operations. Establish seeding schedule including adjustment to existing soils in regards to preparation, fertility and seeding operations.
 - 2. Use introduced seed species only in places where they will not spread into existing natural areas.
 - 3. Seed grasses and legumes no more than 1/4 inch deep. Distribute seed uniformly.
 - 4. Mixture with low seeding rates requires special care in sowing to achieve proper seed distribution.
 - 5. Seed may be broadcast, drilled, or hydroseeded depending on site conditions.
 - 6. Seed in two equal passes in opposite directions to provide adequate coverage.
 - 7. Use chisel plowing or other approved method as required for soils that are compacted to loosen compacted soil in preparation for seeding.
 - 8. After seeding operations, lightly roll and compact the seeded area. Water and fertilize in non-wetland restoration areas only. Do not fertilize in wetland restoration areas.
 - 9. Do not over water seeded areas to prevent runoff, erosion and loss of seed.
 - 10. Seed when soil temperatures remain consistently above 53 degrees F.
 - 11. Dormant seed when the soil temperatures consistently below 53 degrees F, typically November 1st until snow cover.
 - 12. Do not mow turf seedlings until the stand is at least 6 inches tall. Leave cut turf at a minimum of 3 inches tall after mowing during the first year of turf establishment.

H. Storm Drain Inlet Protection for Construction Sites: Provide Storm Drain Inlet Protection meeting the requirements of WDNR – CPS 1060.

1. Inlet protection devices are for drainage areas of one acre or less. Route runoff from areas larger than one acre through a designed sediment trapping or settling practice upstream of the inlet.
2. For inlet protection devices, ponding water to settle sediment is permitted, however, do not allow ponding to interfere with the flow of traffic, create a safety hazard, or cause property damage.
3. Provide inlet protection devices with provisions such as weep holes or emergency spillways to safely pass water if inlet protection device becomes clogged.
4. Other than the Type D inlet protection device, do not allow gaps to be left in the material used that would allow the flow of water to bypass the inlet protection device.
5. Install manufactured bags used for inlet protection along a level contour. Turn ends of sandbag row up slope to prevent flow around ends.
6. Stack sandbags to required height. Overlap upper rows of sandbags joints in lower rows.
7. Construct sandbag barriers with a setback of at least 3 feet from toe of slope. Where it is determined to be not practicable due to specific site conditions, sandbag barrier may be constructed at toe of slope, but construct as far from toe of slope as practicable.

I. Ditch Check - Channel: Provide Ditch Checks in Channels meeting the requirements of WDNR – CPS 1062.

1. Install ditch checks so that the minimum height is 10 inches and does not exceed a maximum height of 16 inches for manufactured or biodegradable materials and 36 inches for stone.
2. Install ditch checks with the center lower than the sides forming a weir.
3. Install stone ditch checks to have a minimum top width of 2 feet measured in the direction of flow with maximum slopes of 2:1 (horizontal:vertical) on the upslope side and 2:1 on the down slope side.
4. Install at a minimum, one ditch check for every two feet of drop in the channel.
5. Place ditch checks such that the resultant ponding will not cause inconvenience or damage to adjacent areas.

6. Remove sediment deposits when deposits reach one-half of the height of the ditch check. Replace underlain fabric and stone removed during sediment removal.
 7. Establish ditch checks upon commencing rough grading operations and remove ditch checks upon completion of final grading and channel stabilization is established.
 8. Install sediment logs and wattles as directed by manufacturer's written instructions.
- J. Sediment Basin (Temporary): Provide Temporary Sediment Basins meeting the requirements of WDNR – CPS 1064.
1. Install earthen embankments of sediment basins meeting the following criteria:
 - a. Strip the base of the embankment of vegetation, stumps, topsoil and other organic matter.
 - b. Construct side slopes to be 3:1 or flatter. Construct the minimum embankment top width to be adequate to provide structural stability. Where applicable, construct the top width to be wide enough to provide maintenance access.
 - c. Install a core trench or keyway along the embankment.
 - d. Bed and backfill any pipes extending through the embankment with equivalent soils used to construct the embankment.
 - e. Compact bedding and backfill in lifts and to the same standard as the embankment.
 - f. Excavate a completed embankment to have a minimum side slope of 1:1 or flatter.
 2. Install sediment basin to have both a principal outlet and an overflow spillway.
 3. Construct outlets in conjunction with the remainder of the basin and prior to the basin receiving runoff.
 4. Design principal water quality outlet to pass the 1-year, 24-hour storm without use of the emergency overflow spillway or other basin outlets.

5. Construct emergency overflow spillway to consist of an open channel constructed adjacent to the embankment and built over a stabilized area.
 6. Design emergency overflow spillway to carry the peak rate of runoff expected from a 10-year, 24-hour design storm.
 7. Incorporate preventive measures for ice damage, trash accumulation and erosion at the outfall of outlets.
 8. Install protective measures to prevent clogging on outlet sizes 8 inches in diameter and smaller.
- K. Sediment Trap: Provide Sediment Traps meeting the requirements of WDNR – CPS 1063.
- L. Construction Site Diversion: Provide Construction Site Diversions meeting the requirements of WDNR – CPS 1066.
1. Upon completion of construction activities, fill, grade and compact temporary berms and channels to designed elevations.
- M. Temporary Grading Practices for Erosion Control: Provide Temporary Grading Practices meeting the requirements of WDNR – CPS 1067.
- N. Dust Control on Construction Sites: Provide Dust Control on Construction Sites meeting requirements of WDNR – CPS 1068.
- O. Cofferdam:
1. Install appropriate soil and erosion and sediment control measures prior to the commencement of instream activities.
 2. Provide for emergency overflow at the center of the cofferdam to prevent erosion along the banks. Include an energy dissipating surface on the overflow system.
 3. Size the diversion or bypass flow to safely convey the 2-year peak flow, at a minimum. Design the cofferdam to overtop for any events greater than the 2-year peak elevation, unless higher peak flows are being bypassed.
 - a. If waterway information is not available, the ordinary high water mark can be used as an indicator.
 4. Construct cofferdams in accordance with manufacturer specifications, where applicable.

3.4 MAINTENANCE

- A. Inspect erosion control devices within 24 hours after each rainfall or daily during periods of prolonged rainfall.
- B. Repair or replace damaged or defective materials or installations immediately.
- C. Install more staples or more frequent anchoring trenches if there are signs of rilling under the mat. Remove the section of mat where the damage has occurred if rilling becomes severe enough to prevent establishment of vegetation. Fill the eroded area with topsoil, compact, reseed and replace the section of mat, trenching and overlapping ends per manufacturer's recommendations.
- D. Remove sediment deposits within 24 hours after each storm event or when deposits reach one-half height of fence or barrier, whichever occurs first.
- E. Apply replacement bales or additional mulch, netting, or matting immediately to maintain suitable cover.
- F. Where vegetative cover has been placed, inspect until vegetative cover is established and functioning as intended.

3.5 REMOVAL OF EROSION CONTROL DEVICES

- A. Maintain erosion control measures until disturbed earth has been paved or vegetated.
- B. Remove erosion control devices prior to final completion.
- C. Restore or replace areas disturbed or damaged by removal of erosion control devices to satisfaction of the RESIDENT PROJECT REPRESENTATIVE.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 31 41 00

SHORING, SHEETING AND BRACING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Work required for protection of all excavations and structures including those that may employ shoring, sheeting, bracing, trench boxes, and other means of earth retention systems whether temporary or permanent.
- B. Related Work Specified In Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 31 23 16 - Excavation
 - 2. Section 31 23 23 - Backfilling
 - 3. Section 33 05 23 - Jacking, Augering and Mining

1.2 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Quality Control:
 - 1. A certificate (only), signed and sealed by a Licensed Professional Engineer experienced in Structural Engineering and registered in the State of Wisconsin, that certifies that the Licensed Professional Engineer has evaluated and approved the CONTRACTOR's excavation plan and has prepared complete design calculations and working drawings for the shoring, sheeting and bracing, not specifically shown on the Drawings, which will be used for excavation support. Provide a separate certificate for each excavation before starting the excavation. Where commercially manufactured trench boxes are to be used, provide a certificate from the CONTRACTOR'S Licensed Wisconsin Professional Engineer stating the conditions under which the trench boxes will be used.
- C. Comply with the "Use of American Iron and Steel (UAIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specification Section 00 45 49.

1.3 REFERENCES

- A. Codes and standards referred to in this Section are:

1. Federal, State and local laws and regulations applying to the design and construction of shoring, sheeting and bracing.
2. National Bureau of Standards Building Science Series 127 “Recommended Technical Provisions for Construction Practice in Shoring and Sloping Trenches and Excavations.”

PART 2 PRODUCTS

2.1 MANUFACTURERS AND MATERIALS

- A. Use manufacturers and materials for shoring, sheeting and bracing as recommended by the CONTRACTOR’s Licensed Wisconsin Professional Engineer who designed the shoring, sheeting, and bracing. Where wood lagging is to be left in place, use oak or treated fir or treated pine. Use only environmentally safe treatment for wood lagging.

PART 3 EXECUTION

3.1 SHORING, SHEETING AND BRACING INSTALLATION

- A. General: Provide safe working conditions, prevent shifting of material, prevent damage to structures or other Work, and avoid delay to the Work, in accordance with applicable laws and regulations. Properly shore, sheet, and brace excavations that are not cut back to the proper slope, as determined by the CONTRACTOR’s Licensed Professional Engineer.
 1. Take sole responsibility for the design and adequacy of shoring, sheeting and bracing not shown on the Drawings.
 2. Take sole responsibility for the methods of installation of the shoring, sheeting and bracing.
 3. Provide trench excavation support systems such that the live load surcharge from railroad track(s), road(s), structures, utilities, or other items adjacent to the excavation system is accounted for in accordance with the requirements of the local authority having jurisdiction. The local authorities having jurisdiction include, but is not limited to, the following:
 - a. Canadian National Railroad
 - b. City of New Berlin
 - c. City of Waukesha
 - d. Town of Waukesha
 - e. Waukesha County
 - f. Wisconsin and Southern Railroad
 - g. Wisconsin Department of Transportation

- B. Arrange shoring, sheeting and bracing so as not to place any strain on portions of completed Work until the general construction has proceeded far enough to provide ample strength.
- C. If the CONTRACTOR or its Licensed Professional Engineer is of the opinion that at any time the CONTRACTOR's excavation plan, shoring, sheeting or bracing is inadequate or unsuited for the purpose, take immediate and appropriate action. Provide a new design certificate if the CONTRACTOR's excavation plans, shoring, sheeting or bracing require modifications.
- D. Monitoring: Periodically monitor horizontal and vertical deflections of sheeting, shoring and bracing.
- E. Accurately locate underground utilities and take the required measures necessary to protect them from damage. Keep underground utilities in service.
- F. Remove shoring, sheeting and bracing as the excavation is refilled in a manner to avoid the caving in of the bank or disturbance to adjacent areas or structures or pipe bedding.
 - 1. Carefully fill voids left by the withdrawal of the shore, sheeting and bracing. No separate payment will be made for the filling of such voids.
 - 2. If pipe bedding is disturbed, re-compact it to meet specified density requirements.
- G. Permission for Removal: Obtain permission from the CONTRACTOR's Licensed Professional Engineer before the removal of any shoring, sheeting or bracing. Retain the responsibility for injury to structures or to other property or persons for failure to leave such shoring, sheeting and bracing in place even though permission for removal has been obtained.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 32 11 23

BASE COURSES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for material and installation of Aggregate Base Course and Granular Subbase Course for asphalt pavement, concrete pavement, concrete sidewalk, asphalt trails, or for the use as temporary roadways, in accordance with the State Specifications.
- B. The Work includes, but is not limited to the following items, as shown and specified herein:
 - 1. Subgrade preparation in accordance with Section 301 of the State Specifications.
 - 2. Providing aggregate materials from offsite sources, including transportation to the site and handling and stockpiling of material.
 - 3. Placement of aggregate base and granular subbase course constructed in lifts as specified by the State Specifications.
 - 4. Compaction of granular materials in accordance with Sections 301 and 350 of the State Specifications.
 - 5. Final finish and completion of aggregate base and granular subbase courses, smoothed and conformed to the alignment, grades, and cross sections shown.
 - 6. Protection and repair of completed aggregate base and granular subbase courses as necessary or required.
- C. Related Work specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 01 73 29 - Cutting and Patching
 - 3. Section 31 10 00 - Site Clearing
 - 4. Section 31 23 16 - Excavation
 - 5. Section 31 23 23 - Backfilling

6. Section 32 12 00 - Asphalt Paving
7. Section 32 13 00 - Concrete Paving
8. Section 32 16 13 - Concrete Curbs
9. Section 32 16 23 - Concrete Sidewalks

1.2 REFERENCES

A. Codes and standards referred to in this Section are:

1. ASTM (American Society of Testing and Materials)
 - a. C88 – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
 - b. C127 – Standard Test Method for Relative Density (Specific Gravity) and Absorption of Course Aggregate
 - c. C131 – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - d. C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - e. C142 – Standard Test Method for Clay Lumps and Friable Particles in Aggregates
 - f. D1140 – Standard Test Methods for Amount of Material in Soils Finer than the No. 200 (75-um) Sieve
 - g. D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
 - h. D4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
 - i. D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

2. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, including the supplemental specifications and recurring special provisions, referred to as the "State Specifications"

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings: Submit the gradation data, unit weight, moisture-density and other important data as specified in Section 31 23 23 - Backfilling and in Section 301 of the State Specifications.
- C. Samples: Submit a 50-pound sample of each grade of material when requested by the RESIDENT PROJECT REPRESENTATIVE.
- D. Quality Control: Submit the following not less than 15 days before material is to be delivered.
 1. Material certificates signed by the material producer certifying that the following items comply or exceed specifications:

Property	ASTM Test	Data Required
Sieve Analysis for fine and course aggregates	C136	Percent passing selected sieves
Soundness of aggregates by use of sodium sulfate or magnesium sulfate	C88	Percent Loss
Atterberg limits	D4318	Plasticity Index and Liquid Limit
Resistance to degradation of large size coarse aggregate by abrasion and impact in the Los Angeles machine	C131	Percent Loss
Clay lumps and friable particles in aggregates	C142	Percent
Crushed faces	--	Percent with one crushed face
Specific gravity	C127	Specific gravity
Amount of soil finer than No. 200 sieve	D1140	Percent

PART 2 PRODUCTS

2.1 MATERIALS

- A. General Aggregate Requirements: Adhere to Sections 301, 305, 310 and 350 of the State Specifications and to the following general and specific aggregate requirements:
 - 1. Use crushed stone material for the base and subbase courses produced from oversized quarried aggregate, sized by crushing and produced from a naturally occurring single source.
 - 2. Provide rocks that are clean, hard, sound, durable, uniform in quality, and free of any detrimental quantities of soft, friable, thin, elongated or laminated pieces, disintegrated material, organic matter, oil, alkali, or any other deleterious material.
 - 3. Process and blend materials to meet the gradation requirements at the crushing plant or material source.
 - 4. Percentages specified herein are determined by weight.
- B. Dense Graded Base Course: Provide dense graded base courses in accordance with Section 305 of the State Specifications.
 - 1. Provide dense graded base of 1 1/4-inch gradation crushed stone in the top 4 inches of base. A 3-inch crushed stone may be substituted for 1 1/4-inch in lower base zones including material underlying the shoulder in accordance with Section 305.2 of the State Specifications.
 - 2. Provide 3/4-inch gradation crushed stone in shoulders. Use 3/4-inch to match the thickness of the paved shoulder in the unpaved portion of the shoulder and on exposed shoulder fore slopes. A 1 1/4-inch crushed stone may be substituted for 3/4-inch elsewhere in shoulders and shoulder fore slopes. If using 1 1/4-inch, limit the allowable reclaimed asphalt content to 50 percent or less in accordance with Section 305.2 of the State Specifications.
 - 3. Provide dense graded base as the base course for concrete pavement concrete curb, concrete sidewalk and permanent asphalt pavement at the locations and of the thicknesses shown.
 - 4. Provide the thickness of the dense graded base as shown.
 - 5. Provide crushed stone, crushed gravel, or crushed concrete meeting the specified gradations. Reclaimed asphalt, reprocessed material, or blended material is not acceptable.

- C. Open Graded Base Course: Provide open graded base courses in accordance with Section 310 of the State Specifications.
 - 1. Provide open graded base of crushed stone with gradation in accordance with Section 310.2 of the State Specifications.
 - 2. Provide open graded base as the base course for concrete pavement at the locations and of the thicknesses shown.
- D. Geotextile Fabric Type SAS:
 - 1. Provide Geotextile Fabric Type SAS (Subgrade Aggregate Separation) in accordance with Section 645.2.2 of the State Specifications.
- E. Granular Subbase Course:
 - 1. Provide subbase materials of a mixture of either sand sized particles or sand sized particles mixed with gravel, crushed gravel, or crushed stone with gradation in accordance with Section 209.2 of the State Specifications.

PART 3 EXECUTION

3.1 PREPARATION OF SUBGRADE

- A. General: Prepare subgrade according to Section 350 of the State Specifications and as summarized below.
 - 1. Excavate or fill the subgrade, as required and then grade and compact to provide a firm foundation of uniform density throughout as shown. Compact the upper 12 inches or greater depth, if shown, to 95% of the maximum dry density as determined by ASTM D1557 at optimum moisture content + or – 3 percent. Confirm that the completed subgrade is true to alignment, grade and cross section, including required crown.
 - 2. Prior to placement of any fill required to bring subgrade to proper level, strip areas to be covered of any loose or otherwise unapproved fill materials, organic materials, or any foreign or deleterious matter.
 - 3. Fill holes, ruts, and similar defects. Cut out unstable areas, stone or rock, and similar defects and fill with compacted soil.
 - 4. Rework areas that do not appear to provide proper drainage.
- B. If the subgrade subsequently loses its density due to exposure to severe weather conditions after having been previously compacted to the required density, scarify, wet or dry, the subgrade as required, and compact to the required density.

- C. When a sheepsfoot roller is used to compact the subgrade, finish the compaction by either a 3-wheel roller or multiple-wheel rubber-tired roller of sufficient weight to smooth out and compact the indentations made by the sheepsfoot roller.
- D. Proof rolling: Confirm that the following proof rolling requirements are met:
 - 1. Proof roll the top surface of the compacted subgrade by making a minimum of two complete coverages with a heavy rubber tired roller at not less than 2 1/2 mph or more than 5 mph. Two coverages are defined by two applications of one wheel load over each point of the subgrade. Witnessed proof rolling.
 - 2. Use roller with a gross weight of not less than 25 tons and not less than 4 pneumatic tire wheels that delivers a compression of not less than 650 pounds per inch width of tire tread.
 - 3. If under the action of proof rolling the subgrade yields, pumps or otherwise fails, remove the failed area to a minimum depth of 2 feet and replace with suitable fill compacted as specified in Section 31 23 23 - Backfilling and as shown. The subgrade is considered failed if under the operation of the roller, the surface shows yielding or rutting of more than 2 inches measured from the top of the construction grade to the bottom of the rut.

3.2 PLACEMENT OF SUBBASE COURSE

- A. Placement and Compaction: Adhere to Section 350 of the State Specifications and to the following general and specific placement requirements:
 - 1. General: Place and compact the granular subbase course in accordance with Section 350 of the State Specifications.
 - 2. Special compaction testing may be required dependent on site conditions in accordance with Section 301.3.4.3 of the State Specifications.
 - 3. Place the subbase course to the thicknesses shown.
 - 4. Verify that the material deposited contains the amount of moisture required for compaction prior to placement uniformly distributed throughout the material. Mix water and granular material at a central mixing plant equipped with a mechanical mixing device and granular material and water measuring devices. Wetting the aggregate by jetting in cars, bins, stockpiles or trucks is not permitted. Add moisture to the material during compaction, only when it is necessary to increase the percentage of moisture to obtain satisfactory compaction.
 - 5. Place the subbase in layers not more than 6 inches compacted thickness. Spread and compact each layer in a similar manner.

6. Deposit the subbase material full-width with a mechanical spreader or spreader box in a manner which will not cause segregation, and which will require minimum blading or manipulation. The equipment and method used is subject to approval by the RESIDENT PROJECT REPRESENTATIVE.
 7. Compact each layer immediately after placement to a density of not less than 95 percent of the maximum dry density as determined by ASTM D1557 at an optimum moisture content + or – 2 percent.
 8. Commence rolling along the edge of the road or area to be compacted and gradually advance toward the center of the area to be compacted.
 9. Operate rollers along lines parallel with the centerline of the road being constructed.
 10. If any earth is worked into the granular material during the compacting or finishing operations, remove and replace granular material within the affected area with new granular material. The RESIDENT PROJECT REPRESENTATIVE may restrict hauling over the completed or partially completed Work after inclement weather or at any time when the earth subgrade is soft and there is a tendency for the earth to work into the granular material.
 11. If compaction tests indicate that the compacted aggregate does not comply with density requirements, provide additional wetting or drying, if necessary, and rolling until the specified density is obtained.
 12. Place and compact the subbase course a maximum of three days prior to placement of the base course.
- B. Protection and Repair: Perform any Work necessary to protect the completed subbase course prior to placement of the base course and to perform any Work and furnish any materials necessary to repair or restore a completed subbase course damaged by traffic or weather.

3.3 PLACEMENT OF BASE COURSE

- A. Placement and Compaction. Adhere to the following general and specific placement requirements:
1. General:
 - a. Place and compact the dense graded base course in accordance with Section 305.3 of the State Specifications.
 - b. Place and compact the open graded base course in accordance with Section 310.3 of the State Specifications.

2. Place the base course to the thicknesses shown.
3. Verify that the aggregate deposited on the subgrade or the subbase contains the amount of moisture required for compaction prior to placement uniformly distributed throughout the material. Mix water and granular material at a central mixing plant equipped with a mechanical mixing device and granular material and water measuring devices. Wetting the aggregate by jetting in cars, bins, stockpiles or trucks is not permitted. Add moisture to the material during compaction, only when it is necessary to increase the percentage of moisture to obtain satisfactory compaction.
4. Place the base course in layers not more than 6 inches compacted thickness. Spread and compact each layer in a similar manner.
5. Deposit the aggregate full-width, directly on the prepared subgrade or subbase, or on the preceding layer of compacted aggregate with a spreader. When placed, ensure aggregate is free from segregation and requires minimum blading or manipulation.
6. Immediately after the material has been placed, compact with a tampering roller, or with a pneumatic-tired roller, or with a vibratory machine, or with a combination of any of the three. Give the top layer a final rolling with a three-wheel or tandem roller. Commence rolling along the edge of the road or area to be compacted and gradually advances toward the center of the area to be compacted. The manner of compaction is subject to approval by the RESIDENT PROJECT REPRESENTATIVE.
7. Compact each layer immediately after placing to a density of not less than 95% of the maximum dry density as determined by ASTM D1557 at an optimum moisture content + or – 2 percent.
8. If any subgrade material is worked into the base material during the compacting or finishing operations, remove granular material within the affected area and replaced with new aggregate. The RESIDENT PROJECT REPRESENTATIVE may restrict hauling over the completed or partially completed Work after inclement weather or at any time when the subgrade is soft and there is tendency for the subgrade material to work into the base material.
9. Perform compaction tests on each layer of material. If compaction tests indicate that the compacted aggregate does not comply with density requirements, provide additional wetting or drying, if necessary, and rolling until the specified density is obtained.

B. Protection and Repair:

1. Protect the completed base course as required or directed by the RESIDENT PROJECT REPRESENTATIVE and perform any Work and furnish any materials necessary to repair or restore a completed base course damaged by traffic or weather.

3.4 THICKNESS TOLERANCES

- A. Thickness determinations will be made at points selected by the RESIDENT PROJECT REPRESENTATIVE. When the average constructed thickness is less than 95 percent of the thickness shown, add additional aggregate to obtain the required thickness.

3.5 SURFACE TOLERANCES

- A. Check for deviations from grades.
- B. Confirm that the surface of the top of the base course is smooth on top and within 0.05 feet of the elevations shown, or the elevations of the existing roads that were removed as a part this contract. Document and submit existing roadway elevations to the RESIDENT PROJECT REPRESENTATIVE prior to removal during demolition.

3.6 INSPECTION AND TESTING

- A. Sampling and Testing: Provide sampling and laboratory methods in accordance with Section 301 of the State Specifications and in accordance with the appropriate ASTM Standard Specification. Subject base and subbase courses to these tests. Furnish and perform compaction testing by an approved independent testing agency. Perform nuclear density testing in accordance with ASTM D6938. The RESIDENT PROJECT REPRESENTATIVE reserves the right to double check compaction, moisture content, gradation, and proctor values and reject unsatisfactory Work.
- B. Correction of Work: Correct any areas of unsatisfactory compaction by removal and replacement or by scarifying, aerating, or sprinkling as needed and recompaction and retesting in place prior to placement of a new lift at no cost to the OWNER.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 32 12 00
ASPHALT PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for material and installing permanent and temporary asphalt pavements and asphaltic flumes in accordance with Sections 450, 455, 460 and 465 of the State Specifications and as shown.
- B. Related Work Specified In Other Sections Includes, But is Not Limited to, the following:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 33 00 - Submittals
 - 3. Section 32 11 23 - Base Courses
 - 4. Section 32 13 00 - Concrete Paving
 - 5. Section 32 16 13 - Concrete Curbs

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, including the supplemental specifications and recurring special provisions, referred to as the "State Specifications"
 - 2. City of Waukesha Standard Construction Specifications.

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings:
 - 1. Proposed mix design in accordance with Sections 450, 455, 460 and 465 of the State Specifications.

C. Quality Control:

1. Test Reports

- a. Submit test reports necessary to show compliance with the Contract Documents and with Sections 701, 710 and 715 of the State Specifications.
- b. Provide tests and perform inspections by Quality Control (QC) Certified Technicians in accordance with these Specifications, at no cost to the OWNER including:

(1) Laboratory Test Report.

(2) Batch Plant Inspection Report.

- 2. Submit material certificates signed by material producer and CONTRACTOR, certifying that each material item is from a WisDOT approved source and per Sections 701, 710 and 715 of the State Specifications.

1.4 QUALITY CONTROL AND QUALITY ASSURANCE (QC/QA)

- A. Provide QC of bituminous production and paving including providing testing laboratory at the plant, QC tests and inspections at the plant and in the field, corrective actions, maintenance of QC plan and control charts and other quality control activities in accordance with Section 460 of the State Specifications. The cost for QC testing will be borne by the CONTRACTOR and incidental to the price for the asphalt pavements.
- B. Provide QA of bituminous paving inspections and tests specified herein, or deemed required by the RESIDENT PROJECT REPRESENTATIVE, by a testing laboratory. Patch cuts made for test samples. The cost for QA testing will be borne by the CONTRACTOR and incidental to the price for the bituminous concrete pavements.
- C. Include analysis and determination of the quality of various bituminous compositions, base material, and compaction of bituminous paving, verifying design as indicated or required.

1.5 MAINTENANCE PERIOD

- A. CONTRACTOR to provide a maintenance period for paving that meets the requirements of the authority having jurisdiction.

PART 2 PRODUCTS

2.1 HOT MIX ASPHALT (HMA) PAVEMENT

- A. Provide HMA pavements in accordance with Sections 450, 455, 460 and 465 of the State Specifications.
- B. Provide asphaltic pavement used for roadway pavement of HMA Pavement Type MT unless specified otherwise in the plans. Provide asphaltic material for the lower layer and upper layer of asphaltic material PG58-28.
- C. Provide asphaltic pavement used for temporary pavement, driveways and asphaltic flumes of HMA Pavement Type LT. Provide asphaltic material of asphaltic material PG58-28
- D. Provide asphaltic pavement used for recreation trails and asphalt shared-use paths of HMA Pavement Type 5 LT 58-28 S to the dimensions and thickness shown in the plans.
- E. Provide aggregate conforming to the requirements of Section 460.2.2 of the Standard Specifications with the lower layer comprised of a nominal size of 19.0 mm and the upper layer comprised of a nominal size of 12.5 mm.
- F. Where existing pavement is replaced, provide a minimum pavement thickness of 4 inches or existing thickness, whichever is greater. Provide lower layer with a thickness of 2-1/4 inches minimum.
- G. Provide materials for tack coat conforming to the requirements of Section 455.2.5 and of MS-2, SS-1, SS-1h, CSS-1 or CSS-1h.

PART 3 EXECUTION

3.1 INSPECTION

- A. Before placing asphalt pavement, RESIDENT PROJECT REPRESENTATIVE will examine substrate surfaces to determine that they are free of conditions which might be detrimental to proper and timely completion of the work. Acceptance of the substrate by the RESIDENT PROJECT REPRESENTATIVE must be prior to the start of work.

3.2 SURFACE PREPARATION

- A. Install bituminous concrete pavement in accordance with Sections 450 and 455 of the State Specifications.
- B. When required, remove existing pavement by saw, pneumatic hammer or wheel, cutting edges of the existing roadway. After the Aggregate Base Course is shaped

and compacted, place the type of pavement as required in this Section to match existing pavement as shown.

- C. Extend pavement removal to a seam or joint if seam or joint is within 3 feet of damaged or cut pavement.

3.3 PLACING MIX

- A. Install bituminous concrete pavement in accordance with Sections 460 and 465 of the State Specifications.
- B. Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 250 degrees Fahrenheit. Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.
- C. Complete placement and compaction in accordance with Section 450, 455, 460 and 465 of the State Specifications. The paving must be maintained until overlaid with a wearing course, thickness as shown. Compacted surface course must be a minimum of 1-1/2 inches in depth. This minimum thickness must also apply to areas requiring resurfacing. Place in strips not less than 10 feet wide, unless otherwise acceptable to the RESIDENT PROJECT REPRESENTATIVE. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
- D. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
- E. Make joints between old and new pavements, or between successive day's Work, to ensure continuous bond between adjoining Work. Construct joints to have same texture, density, and smoothness as other sections of HMA course. Clean contact surfaces and apply tack coat.

3.4 ROLLING

- A. Complete work in accordance with Sections 460 and 465 of the State Specifications.
- B. Begin rolling when mixture will bear roller weight without excessive displacement.
- C. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

- D. Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
- E. Perform breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
- F. Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained density.
- G. Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot HMA. Compact by rolling to specified surface density and smoothness.
- H. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- I. Erect barricades to protect paving from traffic until mixture has cooled enough to not become marked.

3.5 TACK COAT

- A. Complete work in accordance with the State Specifications.
- B. If asphaltic upper layer is applied to an existing street or is not applied the same day as lower layer, tack coat the existing street or lower layer prior to surface paving. Prior to placement of tack coat, thoroughly clean and broom the streets. Apply tack coat at a rate of 0.10 gallons per square yard immediately prior to placement of asphaltic upper layer.
- C. In situations where traffic must be maintained, do not place tack coat on the traveled half of the street until traffic can be switched to the new pavement.

3.6 JOINTS

- A. Complete work in accordance with the State Specifications.
- B. Construct and treat joints between old and new pavements or between successive day's work to ensure thorough and continuous bond between the old and new mixtures. Construct transverse construction joints by cutting the material back for its full depth so as to expose the full depth of the course. Where a header is used, the cutting may be omitted provided the joint conforms to the specified thickness. Treat these joints with tack coat material applied with a hose and spray nozzle attachment to fully coat the joint surface.

- C. Make the longitudinal joint by overlapping the screed on the previously laid material for a width of not more than 2 inches and depositing a sufficient amount of asphaltic mixture so that the finished joint will be smooth and tight. Do not place longitudinal joints in the upper layer immediately over similar joints in the lower layer beneath. Provide a minimum distance of 12 inches between the location of the joints in the lower layer and the location of similar joints in the upper layer above.

3.7 FINISHING ROADWAY

- A. Fine-grade the finished base course in preparation for HMA paving. Remove base course ramps at existing pavement to provide a full depth butt joint. Hand-trim base course around manhole castings and valve boxes and compacted with a vibratory plate compactor.
- B. Include all following preparatory and finishing items and any other incidental items of work required for construction. Remove asphaltic ramps around manholes on existing lower layer to receive upper layer. Install asphaltic ramps on manholes and at butt joints in areas to receive lower layer only.

3.8 FIELD QUALITY CONTROL

- A. Comply with Sections 460.3 and 465.3 of the State Specifications.
- B. Comply with the requirements of the Americans with Disabilities Act, including but not limited to slopes, smoothness and changes in elevation.
- C. Testing in-place HMA courses for compliance with requirements for thickness and surface smoothness will be done by the CONTRACTOR's testing laboratory per Section 460 of the State Specifications. Repair or remove and replace unacceptable paving as directed by RESIDENT PROJECT REPRESENTATIVE.
- D. In-place compacted thickness tested in accordance with ASTM D3549 will not be acceptable if exceeding following allowable variations:
 - 1. Base course within plus or minus 1/2 inch.
 - 2. Surface course within plus or minus 1/4 inch.
- E. Test finished surface of each HMA course for smoothness, using a 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.
 - 1. Base course surface within 1/4 inch.
 - 2. Wearing course surface within 3/16 inch.

- F. Check surface areas at intervals as directed by RESIDENT PROJECT REPRESENTATIVE.
- G. No vehicular traffic or loads must be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of fines. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the RESIDENT PROJECT REPRESENTATIVE. Repair any damaged pavement and unsatisfactory Work revealed by testing as specified and as shown, to the satisfaction of the RESIDENT PROJECT REPRESENTATIVE, at no additional cost to the OWNER.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 32 13 00
CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for material and installation of concrete pavement in accordance with Section 415 of the State Specifications and as shown.
- B. Related Work Specified In Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 03 30 10 - Structural Concrete
 - 2. Section 31 23 16 - Excavation
 - 3. Section 32 11 23 - Base Courses
 - 4. Section 32 12 00 - Asphalt Paving
- C. Comply with the “Use of American Iron and Steel (UAIS)” requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specifications Section 00 45 49.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. American Association of State Highway Transportation Officials (AASHTO):
 - a. AASHTO M235 – Standard Specifications for Epoxy Resin Adhesives
 - 2. American Concrete Institute (ACI):
 - a. ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete
 - b. ACI 305R – Guide for Hot Weather Concreting
 - c. ACI 306R – Guide for Cold Weather Concreting
 - d. ACI 308R – Guide for Curing Concrete

- e. ACI 309R – Guide to Consolidation of Concrete
- f. ACI 311.1R – ACI Manual of Concrete Inspection
- g. ACI 318 – Building Code Requirements for Structural Concrete
- h. ACI 347 – Guide to Formwork for Concrete
- 3. American Society for Testing and Materials (ASTM):
 - a. ASTM C94 – Standard Specification for Ready-Mix Concrete
 - b. ASTM D695 – Standard Specification for Standard Test Method for Compressive Properties of Rigid Plastics
- 4. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, including the supplemental specifications and recurring special provisions, referred to as the “State Specifications”
- 5. City of Waukesha Standard Construction Specifications.

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop drawings:
 - 1. Proposed mix design in accordance with Sections 701, 710 and 715 of the State Specifications.
- C. Quality Control
 - 1. Test Reports
 - a. Submit test reports necessary to show compliance with the Contract Documents and with Sections 701, 710 and 715 of the State Specifications.
 - b. Submit laboratory test reports and batch plant inspection reports. Perform testing and inspection by Quality Control (QC) Certified Technicians in accordance with this Section, at no cost to the OWNER.

1.4 QUALITY CONTROL

- A. Provide quality control for concrete in accordance with Sections 701, 710 and 715 of the State Specifications.

B. Perform Work in accordance with the latest edition, of the appropriate divisions, of the following:

1. ACI 311.1R "ACI Manual of Concrete Inspection".
2. ACI 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete", except minimum cement content must be herein specified.
3. CSI "Manual of Standard Practice"
4. ACI 318 "Building Code Requirements for Structural Concrete".
5. ASTM C94 "Specifications for Ready Mixed Concrete".
6. ACI 305R "Hot Weather Concreting".
7. ACI 306R "Cold Weather Concreting".
8. ACI 308R "Guide to Curing Concrete".
9. ACI 309R "Guide to Consolidation of Concrete".
10. ACI 347 "Guide to Formwork for Concrete".
11. AASHTO M235 "Epoxy Resin Adhesives"
12. ASTM D695 "Standard Test Method for Compressive Properties of Rigid Plastics"

1.5 MAINTENANCE PERIOD

A. CONTRACTOR to provide a maintenance period for paving that meets the requirements of the authority having jurisdiction.

PART 2 PRODUCTS

2.1 MATERIALS:

A. Provide concrete in accordance with Section 415.2 of the State Specifications.

B. Tie Bars and Dowell Bars

1. Provide tie bars and dowel bars conforming to 505.2.6 of the State Specifications.
2. Epoxy for Anchoring Dowel Bars and Tie Bars:
 - (1) Furnish epoxy consisting of a 2-component epoxy material of contrasting colors and conforming to AASHTO M235, grade 3 - non-

sagging consistency, type IV epoxy, except as modified below: 1. Use class B material for mid-depth slab temperatures between 40 and 60 degrees Fahrenheit. Use class C material for mid-depth slab temperatures between 60 degrees Fahrenheit and the highest temperature allowed by the manufacturer of the product.

- (2) Bond strength, tensile strength, and elongation testing is not required.
- (3) Achieve a minimum compressive yield strength of 5000 psi at 8 hours for special high early strength concrete, or at 3 days for grades A, C, and E concrete. Test according to AASHTO M235 and ASTM D695, with the following restrictions: 1. Mold and cure compressive test specimens in cylinders with a one-inch nominal diameter. 2. Machine specimen ends square to produce a final specimen length of 2 inches.
- (4) Submit a manufacturer's certificate of compliance, and a certified report of test or analysis from a qualified independent laboratory prior to using, to the RESIDENT PROJECT REPRESENTATIVE certifying that the epoxy conforms to these specifications. Identify the temperature classes and compressive strength cure times for which the product is certified.
- (5) The CONTRACTOR may furnish an acrylic adhesive approved by the RESIDENT PROJECT REPRESENTATIVE that meets the same physical requirements specified for epoxy.

2.2 MIXING CONCRETE:

- A. Provide concrete mix in accordance with Sections 701, 710 and 715 of the State Specifications.
- B. Submit duplicate delivery tickets by the ready-mixed concrete producer, one (1) for the CONTRACTOR and one (1) for the RESIDENT PROJECT REPRESENTATIVE, with each load of concrete delivered to the job with the following information:
 1. Date.
 2. Name of ready-mix concrete plant.
 3. CONTRACTOR.
 4. Job Location.
 5. Type (Standard or High Early Strength) and brand of cement.
 6. Cement content in bags per cubic yard of cement

7. Truck number.
 8. Time dispatched and time unloaded.
 9. Admixtures in concrete, if any.
 10. Type and maximum size of aggregate.
 11. Water added at job, if any.
 12. Name of person who authorized addition of water.
- C. Maintain close control of mixing time for air-entrained concrete.
- D. Provide continuous access to the mixer so that the CONTRACTOR'S Quality Control (QC) personnel can periodically check batch proportions and yield strength.

PART 3 EXECUTION

3.1 GENERAL

- A. Install materials in accordance with the State Specifications unless otherwise noted.

3.2 INSPECTION

- A. Before pouring concrete, RESIDENT PROJECT REPRESENTATIVE will examine substrate surfaces to determine that they are free of conditions which might be detrimental to proper and timely completion of the work. Acceptance of the substrate by the RESIDENT PROJECT REPRESENTATIVE must be prior to the start of work.

3.3 PREPARATION

- A. Complete preparation in accordance with Section 415.3 of the State Specifications.
- B. Sub-Grade and Subbase: Before proceeding with the installation of paving or concrete work, carefully examine the subbase and must perform any minor grading, shaping, filling or other preparatory work required in the opinion of the testing laboratory or the RESIDENT PROJECT REPRESENTATIVE prior to placing the base course. Building up of sub-grade under forms after they are in place will not be permitted.
- C. Place tie bars in existing concrete in accordance with Section 416.3.4 of the State Specifications. Tie bars are considered incidental to the Concrete Pavement.

3.4 PLACING CONCRETE

- A. Place concrete in accordance with Section 415.3 of the State Specifications.
- B. Do not place concrete upon frozen base course or subgrade material. Discontinue concrete operations when the air temperature is expected to fall below 40 degrees Fahrenheit during the 24 hour period after placing concrete or when the air temperature is likely to remain below 30 degrees Fahrenheit during the succeeding 6 days; unless provisions for heating aggregates, sand and water have been made, the CONTRACTOR has submitted a Cold Weather Paving Plan, and the methods proposed for protecting the concrete has been approved by the RESIDENT PROJECT REPRESENTATIVE.
- C. Use of accelerating or antifreeze admixtures is not permitted. The CONTRACTOR is responsible for the protection of finished concrete against damage or injury, including freezing until the work has been completed and accepted. Repair and replace any defective work resulting from freezing or damage during placing and curing at no additional cost to the OWNER.
- D. Perform concrete consolidation in accordance with Section 415.3 of the State Specifications.

3.5 CONCRETE PAVEMENT

- A. Construct concrete pavements, including tie bars and dowel bars, in accordance with Section 415.3 of the State Specifications and as shown, to the lines, grades and Sections indicated.
- B. Unless otherwise indicated or shown, lay out pavements into Sections in accordance with Section 415.3 of the State Specifications, separated by expansion joints extending full depth of slab. Unless otherwise shown, expansion filler must be 3/4 inch thick, of material as specified.
- C. Traffic, loading or backfilling must not be allowed on concrete surfaces for 7 days after the concrete has been placed or until 75 percent of design strength is achieved. If the CONTRACTOR seeks permission from the RESIDENT PROJECT REPRESENTATIVE to place traffic, loads, or to backfill before 7 days, the CONTRACTOR QC and their laboratory must make and break additional cylinders for this purpose in the CONTRACTOR'S approved laboratory, subject to verification by the RESIDENT PROJECT REPRESENTATIVE. Repair any damaged areas as shown and specified and to the satisfaction of the RESIDENT PROJECT REPRESENTATIVE, at no additional cost to the OWNER.

3.6 CURING AND PROTECTION

- A. Protect freshly placed concrete from defacement, premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant

temperature for a period of time necessary for hydration of cement and proper hardening.

- B. Protect concrete in accordance with Section 415.3 of the State Specifications.
- C. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
- D. Cure concrete in accordance with Section 415.3 of the State Specifications.

3.7 SURFACE SEALER

- A. Cure concrete pavements in accordance with Section 415 and 501 of the State Specifications.
- B. Concrete pavement poured before October 1 will not require a linseed oil sealer.

3.8 HOT AND COLD WEATHER CONCRETING

- A. Submit a Hot or Cold Weather Paving Plan detailing procedures for production, transportation, placement, protection, curing, testing and temperature monitoring of concrete during hot or cold weather. Include procedures to be implemented upon abrupt changes in weather conditions or equipment failures.

3.9 CLEAN-UP

- A. Collect, remove, and legally dispose of rubbish and debris resulting from the Work.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 32 16 13
CONCRETE CURBS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing concrete curb, concrete curb and gutter, concrete median slope noses, concrete surface drains and trench grates, in accordance with Sections 416.1, 416.2 and 416.3 and 601.1, 601.2 and 601.3 of the State Specifications and as shown.
- B. Related Work Specified in Other Section Includes, But is Not Limited to, the Following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 03 30 10 - Structural Concrete
 - 3. Section 32 11 23 - Base Courses
 - 4. Section 32 13 00 - Concrete Paving
- C. Comply with the “Use of American Iron and Steel (UAIS)” requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specification Section 00 45 49.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM C94 – Standard Specification for Ready-Mix Concrete
 - b. ASTM C309 – Standard Specification for Liquid-Forming Compounds for Curing Concrete
 - c. ASTM D994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
 - 2. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, including the supplemental specifications and recurring special provisions, referred to as the “State Specifications.”

1.3 SUBMITTALS

- A. General: Provide submittals, including the following, as specified in Division 1.
- B. Shop drawings:
 - 1. Proposed mix design in accordance with Sections 701, 710 and 716 of the State Specifications.
- C. Quality Control
 - 1. Test Reports
 - a. Submit test reports necessary to show compliance with the Contract Documents and with Sections 701, 710 and 716 of the State Specifications.
 - b. Submit laboratory test reports and batch plant inspection reports. Perform testing and inspection by Quality Control (QC) Certified Technicians in accordance with this Section, at no cost to the OWNER.

1.4 QUALITY ASSURANCE

- A. Perform work in conformance with Sections 716, 416.2 and 601.2 of the State Specifications, except as modified herein.
- B. Obtain materials from the same source throughout the duration of the work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Concrete Curb, Concrete Curb and Gutter and Concrete Median Slope Noses
 - 1. Provide concrete curb or curb and gutter or concrete median noses conforming to Section 601.2 of the State Specifications.
 - 2. Match thickness, width and shape of the concrete curb or curb and gutter to the existing concrete curb or curb and gutter thickness, width and shape, and the details shown.
- B. Trench Drain
 - 1. Provide concrete curb for the trench drain conforming to Section 601.2 of the State Specifications.

2. Match thickness, width and shape of the concrete curb to the existing concrete curb thickness, width and shape, and to the details shown.
 3. Provide solid steel plate to match thickness, width and shape of the existing solid steel plate thickness, width and shape, and to the details shown.
- C. Concrete Surface Drains: Provide concrete conforming to Section 416.2 of the State Specifications.
- D. Preformed Expansion Joint Filler: Conform to Section 415.2.3 of the State Specifications.
- E. Reinforcing: Conform to Section 505 of the State Specifications.
- F. Curing and Protective Coat: Conform to Section 601 of the State Specifications.
- G. Base Course: Conform to Section 601 of the State Specifications
- H. Joints: Conform to Section 601 of the State Specifications
- I. Tie Bars and Dowel Bars
1. Furnish tie bars and dowel bars conforming to Section 505.2.6 of the State Specifications.
 2. Epoxy for Anchoring Dowel Bars and Tie Bars
 - a. Furnish epoxy consisting of a 2-component epoxy material of contrasting colors and conforming to AASHTO M235, grade 3 - non-sagging consistency, type IV epoxy, except as modified below: 1. Use class B material for mid-depth slab temperatures between 40 and 60 degrees Fahrenheit. 2. Use class C material for mid-depth slab temperatures between 60 degrees Fahrenheit and the highest temperature allowed by the manufacturer of the product.
 - b. Bond strength, tensile strength, and elongation testing is not required.
 - c. Achieve a minimum compressive yield strength of 5000 psi at 8 hours for special high early strength concrete, or at 3 days for grades A, C, and E concrete. Test according to AASHTO M235 and ASTM D695, with the following restrictions: 1. Mold and cure compressive test specimens in cylinders with a one-inch nominal diameter. 2. Machine specimen ends square to produce a final specimen length of 2 inches.
 - d. Submit a manufacturer's certificate of compliance, and a certified report of test or analysis from a qualified independent laboratory prior to using, to the RESIDENT PROJECT REPRESENTATIVE certifying that the epoxy conforms to these specifications. Identify the

- temperature classes and compressive strength cure times for which the product is certified.
- e. The RESIDENT PROJECT REPRESENTATIVE may furnish acrylic adhesive approved by the ENGINEER that meets the same physical requirements specified for epoxy

PART 3 EXECUTION

3.1 PREPARATION OF SUBGRADE AND AGGREGATE BASE

- A. Conform to Section 601 of the State Specifications.
- B. Place materials when ambient temperature above 40 degrees Fahrenheit.
- C. Moisten aggregate base course prior to placing concrete.

3.2 FORMWORK

- A. Conform to Section 601 of the State Specifications.

3.3 TIE BARS AND DOWEL BARS

- A. Place tie bars in existing concrete in accordance with Section 416.3.4 of the State Specifications. Tie bars are considered incidental to the concrete curb or concrete curb and gutter.
- B. Do not install tie bars for concrete curb and gutter in City of Waukesha roadways. Follow City of Waukesha Standard Construction Specifications.

3.4 CURB, CURB AND GUTTER, MEDIAN NOSE AND TRENCH DRAIN CONSTRUCTION

- A. ADA Ramps: Construct wheelchair ramps in conformance with regulatory requirements and as indicated.
- B. Foundation and forms will be checked by RESIDENT PROJECT REPRESENTATIVE before concrete is placed.
- C. Place concrete in accordance with Section 601.3 of the State Specifications.
- D. Expansion Joints: Place joints in accordance with Section 601.3 of the State Specifications.
- E. Contraction Joints: Place joints in accordance with Section 601.3 of the State Specifications.
- F. Finishing: Finish concrete in accordance with Section 601.3 of the State Specifications.

3.5 CONCRETE SURFACE DRAINS CONSTRUCTION

- A. Foundation and forms will be checked by RESIDENT PROJECT REPRESENTATIVE before concrete is placed.
- B. Place concrete in accordance with Section 416.3 of the State Specifications.
- C. Reinforcement: Place reinforcement in accordance with Section 416.3 of the State Specifications.
- D. Finishing: Finish concrete in accordance with Section 601.3 of the State Specifications.

3.6 CURING

- A. Erect and maintain suitable barricades as may be necessary to exclude traffic from newly constructed curb or curb and gutter. Repair or replace curb or curb and gutter damaged by traffic or otherwise damaged prior to acceptance at no cost to the OWNER.
- B. After finishing, cure and protect concrete in accordance with Section 601 of the State Specifications.
- C. Cure and protect concrete along City of Waukesha roadways in accordance with City of Waukesha Standard Construction Specifications.

3.7 BACKFILL

- A. Upon completion of curing period, backfill behind curb with earth fill, free from rocks 2 inches and larger and other foreign material.
- B. Tamp backfill firmly in place.

3.8 TOLERANCES

- A. Provide finished curb or curb and gutter with a uniform appearance for both grade and alignment.
- B. Remove any section of curb or curb and gutter showing abrupt changes in alignment or grade or which is more than 1/4 inch away from section indicated.

3.9 TESTING AND ACCEPTANCE

- A. Compressive Strength: In accordance with Section 601 of the State Specifications.
- B. Smoothness Tolerance: In accordance with Section 601 of the State Specifications.

C. Acceptance Criteria:

1. General:

- a. Remove and replace curb or curb and gutter that are broken or have weakened surfaces caused by over rich cement, rain damage, over finishing, excessive voids, or deleterious material.
- b. Develop and submit a Work Plan for items failing to meet criteria specified in this section.

2. Spalled or Broken Edges:

- a. Greater the 1/2 Inch Length:
 - (1) Saw cut to remove broken concrete back to nearest joint.
 - (2) Pressure wash to remove debris. Provide clean surface.
 - (3) Apply epoxy bonding agent.
 - (4) Replace curb or curb and gutter to indicated section.

3. Slabs with Cracks:

- a. Cracks Greater Than 25 Percent Pavement Thickness: Remove and replace pavements. Remove entire panel, full depth and width.
- b. Cracks Less Than 25 Percent Pavement Thickness: Pressure inject with epoxy resin, Type IV, Grade 1. Completely fill crack. Troweling to fill crack not allowed.

3.10 CLEAN-UP

- A. Remove equipment, forms, and debris from site. Collect, remove and legally dispose of rubbish and debris resulting from the Work.

END OF SECTION

SECTION 32 17 23

PERMANENT PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing pavement markings on pavements in accordance with Sections 646.1, 646.2 and 646.3 of the State Specifications, as shown, as specified herein, and as directed by the RESIDENT PROJECT REPRESENTATIVE.
- B. Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 32 12 00 - Asphalt Paving
 - 3. Section 32 13 00 - Concrete Paving

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, including the supplemental specifications and recurring special provisions, referred to as the "State Specifications"

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings:
 - 1. Product Data: Product data on manufactured products that are not included on the Wisconsin Department of Transportation Approved Product List (APL).

1.4 QUALITY ASSURANCE

- A. Sampling and Testing of products not on the APL:
 - 1. Take a quart sample of each batch of paint by random selection from sealed containers in presence of the RESIDENT PROJECT REPRESENTATIVE.

2. Identify by designated name, specification number, batch number, manufacturer's formulation number, project contract number, intended use, and quality involved.
3. At discretion of the RESIDENT PROJECT REPRESENTATIVE, samples may be tested by the RESIDENT PROJECT REPRESENTATIVE before approval or material may be approved for use based on either of the following data furnished by the CONTRACTOR:
 - a. Test report showing proposed batch meets specified requirements.
 - b. Test report showing previous batch manufactured using same formulation as that used in manufacturing proposed batch met specified requirements, and report showing test results on proposed batch for the following properties required in material specification: weight per gallon, viscosity, fineness of grind, drying time, and gradation.
 - c. If materials are approved based on reports furnished by the CONTRACTOR, samples will be retained by the RESIDENT PROJECT REPRESENTATIVE for possible future testing should material appear defective during or after application. When tested by the RESIDENT PROJECT REPRESENTATIVE and samples fail to meet specification requirements, the materials represented by samples to be replaced and the cost of testing will be deducted from payments due to the CONTRACTOR.

B. Codes and Standards: Meet the State Specifications at a minimum.

1.5 WARRANTIES AND GUARANTEES

- A. Follow the Proving Period guidelines in Section 646.3.1.5 of the State Specifications.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Furnish paint in sealed containers that legibly indicate at time of use designated name, formula or specification number, batch number, color, date of manufacturer, manufacturer's name, formulation number, and directions.

PART 2 PRODUCTS

2.1 EPOXY

- A. Provide permanent pavement markings of yellow or white epoxy conforming to Section 646 of the State Specifications and as shown.

2.2 PERMANENT TAPE

- A. Provide permanent pavement markings of yellow or white permanent tape conforming to Section 646 of the State Specifications and as shown.

PART 3 EXECUTION

3.1 APPLICATION

- A. Clean surfaces to be marked before application of paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water or combination of these methods as required.
- B. Remove existing pavement markings from the existing pavement and curbs where new pavement markings are to be placed in accordance with Section 646 of the State Specifications. Remove the pavement markings in areas of permanent pavement with water blasting or air blasting. Do not perform grinding on permanent pavement.
- C. Use machines, tools, and equipment used in performance of the Work capable of applying stripe widths indicated, at paint coverage rate required, and of even uniform thickness with clear-cut edges conforming to Section 646 of the State Specifications.
- D. Provide grooving in accordance with Section 646 of the State Specifications for grooved permanent tape applications.
- E. Provide stencils for symbols and letters.
- F. Prior to application of the pavement marking, make certain the pavement surface is dry and free of dirt or grease and clean to the satisfaction of the RESIDENT PROJECT REPRESENTATIVE.
- G. Provide pavement markings at the locations shown and in accordance with Section 646 of the State Specifications.
- H. Protect markings from traffic until dry to prevent tracking.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 32 90 00

LANDSCAPING WORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing surface restoration, including soil, seeding, sodding, planting, fertilizing, maintenance, and accessories in areas beyond roadway, sidewalk, and driveway pavement disturbed by construction. Refer to Section 01 41 00 for landscaping work requirements in wetland, waterway, and agricultural areas.
- B. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 01 41 00 - Regulatory and Special Requirements
 - 2. Section 31 23 16 - Excavation
 - 3. Section 31 23 23 - Backfilling

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ASTM C33 – Standard Specification for Concrete Aggregates
 - 2. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, referred to as the “State Specifications”

1.3 SYSTEM DESCRIPTION

- A. Provide surface restoration in areas beyond roadway, sidewalk, and driveway pavement disturbed by construction, including soil, seeding, sodding, planting, fertilizing, maintenance, and accessories in accordance with the requirements of the authority having jurisdiction. The authorities having jurisdiction include, but is not limited to, the following:
 - 1. City of New Berlin
 - 2. City of Waukesha
 - 3. Town of Waukesha
 - 4. Waukesha County
 - 5. Wisconsin Department of Transportation

- B. Unless required otherwise by the authority having jurisdiction, provide surface restoration in accordance with the State Specifications and as specified in this Section.

1.4 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings, Product Data, and Information:
 - 1. Mixtures and product label information for products specified herein.
 - 2. Submittals to WDNR, including the following, as specified:
 - a. Wetland crossing alternatives (if required)
 - b. Waterway Restoration Monitoring Report
 - c. Seed sources
- C. Quality Control:
 - 1. Soil test results.
- D. Operation and Maintenance Manuals:
 - 1. Maintenance Instruction Manual: A landscaping maintenance manual furnished upon completion of the landscaping work. Include complete and detailed instructions on the recommended maintenance procedure to be followed for maintaining lawns and each species of plant material. Include a schedule of planted and seeded materials and pertinent growing and maintenance information and requirements for watering, fertilizing, agricultural limestone applications, spraying, cultivating, pruning and weed control.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle products and materials as specified in Division 1 and as follows.
- B. Topsoil: Separate existing topsoil from excavated material and store on the job site. If imported topsoil is required to supplement job-excavated topsoil, deliver topsoil in a dry state without enough moisture to allow it to be packed or squeezed into a ball.
- C. Balled and Burlapped Stock: Immediately after delivery, set balled plants on the ground with the balls well protected with soil. Water and properly maintain plants

in a shaded location until planting. Plant the plants at the project site in accordance with Section 632 of the State Specifications.

- D. Grass Seed: Deliver grass seed in accordance with Section 630 of the State Specifications. Deliver grass seed in standard size bags of the vendor, showing weight, analysis and name of vendor. Store the seed so as not to impair its effectiveness.
- E. Sod: Deliver sod to the site in fresh condition and within 24 hours of the time it has been dug.
- F. Fertilizer: Deliver fertilizer in accordance with Section 629 of the State Specifications in standard size bags, showing weight, analysis and the name of the manufacturer. Store the fertilizer in a weatherproof storage place in a manner that will keep it dry without affecting its effectiveness.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Seeding and Sodding: Sow grass seed between August 15th and October 15th unless sowing between March 15th and June 1st is approved. Sow seed when the wind velocity is below 15 mph. Place sod between August 15th and October 15th or between March 15th and June 1st, or during the season or seasons which are normal for such work as determined by weather conditions and accepted practice in the locality and as approved.
- B. Planting: Unless otherwise directed, plant deciduous material between March 1st and June 1st or between September 1st and December 1st. Plant evergreen material between April 1st and June 1st or between September 1st and October 1st.

1.7 WARRANTY

- A. General: Warranty seeded, sodded and planted areas for the specified period commencing upon final acceptance of landscaping work.
- B. Plant Material: Warranty plant materials for a period of one year or as required per the authority having jurisdiction.
- C. Seeded Areas: Warranty seeded lawn areas to the time of establishment of an acceptable uniform stand of grass or as required per the authority having jurisdiction.
- D. Sod: Warranty sod for 30 days following the first cutting or as required per the authority having jurisdiction.

1.8 MAINTENANCE

- A. General: Maintain landscape work as follows and in accordance with the authority having jurisdiction during the warranty period. During this period, continue

watering, seeding, cultivating, mowing and trimming of grass, protection from insects and diseases, fertilizing, repairing damage from erosion, washouts, drought, and similar operations as needed to support normal growth and good health for live plant material. Maintain grades and slopes until plantings are established. Repair and re-establish grades in settled areas.

- B. Grass Areas: Maintain seeded and sodded areas to establish a uniform stand of weed-free grass. Reseed or resod areas failing to develop a uniform stand.
 - 1. Protect seeded areas against traffic or other use by warning signs or barricades, as approved by the RESIDENT PROJECT REPRESENTATIVE. Repair surfaces gullied or otherwise damaged following seeding by regrading and reseeding as directed. Water, seed, cultivate, mow, trim, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the landscaping work. Treat areas with excessive weed growth with an application of a select herbicide, as approved by the RESIDENT PROJECT REPRESENTATIVE, and reseed as necessary to establish a satisfactory stand of grass. Water only at night or as approved by the RESIDENT PROJECT REPRESENTATIVE.
 - 2. When the seed application method is used out of season, establish a good stand of grass of uniform color and density to the satisfaction of the RESIDENT PROJECT REPRESENTATIVE. If at the time when the Contract has been otherwise completed it is not possible to make an adequate determination of the color, density, and uniformity of such stand of grass, payment for the unaccepted portions of the areas seeded out of season will be withheld until such time as these requirements have been met.
- C. Trees, Shrubs and Ground Covers: Maintain plant material to be alive, in good growing condition and free of weeds. Cultivate trees, shrubs and ground covers and weed and water when necessary, but not less than twice a month, to prevent plant material from dying. Replace any plant material which is found to be dead or dying during the warranty period to original specifications upon request at no additional cost to the OWNER.
- D. Replacement: Replace plant material and resod or reseed only during the specified planting seasons and warranty the replacement material for the same period of time as the original material.

PART 2 PRODUCTS

2.1 SOIL

- A. Topsoil: Provide a natural, friable, pulverized (completely broken down to remove clods and lumps) topsoil in accordance with Section 625 of the State Specifications of a grade meeting the following limits and free of large roots, sticks, hard clay,

weeds, brush, stones over 1-inch in maximum dimension, material toxic to plant growth, or litter or waste products.

U.S. Standard Sieve	Percent Passing by Weight
1 inch	100
No. 10	90

- B. Planting Mixture: Provide planting mixture by mixing topsoil, sand, and peat moss in accordance with Section 632 of the State Specifications.
- C. pH Adjustment in Non-Wetland and Waterway Areas: Adjust the soil pH pursuant to soil test results to achieve a slightly acid soil. Provide agricultural limestone (calcium carbonate), if required, in accordance with Section 629 of the State Specifications.
- D. pH Adjustment in Wetland and Waterway Areas: Do not adjust the soil pH in wetland and waterway areas.

2.2 GRASS SEED AND SOD

- A. Grass Seed in Non-Wetland and Waterway Areas: Provide a fresh, clean, new crop of grass seed free of noxious weed seeds in accordance with Section 630 of the State Specifications.
- B. Grass Seed in Wetland and Waterway Areas: Provide grass seed within and wetland waterway areas in accordance with Section 01 41 00.
- C. Tag: Tag each sack in accordance with the agricultural seed laws of the United States and the State of Wisconsin. Show on each tag the producer's warranty as to the year grown, percentage of purity, percentage of germination and tests by which the percentages were determine. Provide seed for this project having a test date within 1 year of the date of sowing.
- D. Sod: Provide sod in accordance with Section 631 of the State Specifications. Sod which has been grown on peat or which has been dug more than 24 hours prior to delivery or which has been allowed to have the roots dry out or on which the grass has turned brown will not be accepted.

2.3 PLANT MATERIALS

- A. General: Provide plant materials as follows and in accordance with the authority having jurisdiction. Provide plant materials that are true to species or variety, sound, healthy, vigorously acclimated and free from defects, disfiguring knots, sun-scaled injuries, abrasions of the bark, plant diseases and insect eggs, borers and other forms of infestations. Provide material that has normal, well-developed branch systems

and vigorous root systems and that is freshly dug, nursery-grown stock. Provide material grown under climatic conditions similar to those in the locality of the project for at least 2 years and transplanted or root pruned at least in the last 3 years.

- B. Plant Size: Dimension a plant as it stands in its natural position. Measure trees under 4 inches in caliper at a point 6 inches above the ground and trees more than 4 inches in caliper at a point 12 inches above ground. Provide the stock of an average of the minimum and maximum sizes specified. Do not cut back large shrubs to sizes specified.
- C. Balled, Burlapped and Platformed Plants: Dig balled and burlapped, as well as balled and platformed, plants with sufficient roots and a solid ball of earth securely held in place by burlap and stout natural fiber rope. Manufactured balls are not acceptable. Provide balled and platformed plants with sturdy platforms of a size equal to the diameter of the horizontal midsection of the ball of earth.
- D. Bare-Rooted Plants: Dig bare-rooted plants with sufficient root spread and depth to ensure full recovery and development of the plants. Cover roots for these plants with a uniformly thick coating of mud immediately after they are dug.
- E. Inspection: Submit plants to inspection for approval at the place of growth, for conformity to specification requirements as to quality, size and variety. In addition to the place of growth inspection, submit plants to inspection for approval upon delivery at the job site or during the progress of the work, for size and condition of balls or roots, diseases, insects, and latent defects or injuries. Remove rejected plants immediately from the site. Do not substitute plants for those specified unless approved.

2.4 FERTILIZER

- A. Provide fertilizer in non-wetland restoration areas in accordance with Section 629 of the State Specifications uniform in composition, free flowing, and suitable for application with equipment designed for that purpose. Do not fertilize in wetland restoration areas.

2.5 WATER

- A. Use water obtained from fresh water sources free from deleterious chemicals and other toxic substances harmful to plant life. Do not use brackish water. Identify to the RESIDENT PROJECT REPRESENTATIVE sources of water at least 2 weeks prior to use. The RESIDENT PROJECT REPRESENTATIVE may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. Do not use water from a source which is not approved by the RESIDENT PROJECT REPRESENTATIVE following such tests.

- B. If temporary water from a hydrant is required, obtain necessary permits from the authority having jurisdiction. Provide hoses, meters, backflow preventers, and other connections necessary to perform watering needs and provide water at no additional cost to the OWNER.

2.6 ACCESSORIES

- A. Tree Wrap: Provide new, clean, plain materials in accordance with Section 632 of the State Specifications for wrapping tree trunks.
- B. Weed Barrier Fabric: Provide Pro-5 fabric as manufactured by the DeWitt Co., or equal weed barrier fabric in accordance with Section 632 of the State Specifications.
- C. Gravel: Provide smooth river bed gravel of solid or mixed color range to be as selected and in accordance with ASTM C33 and graded according to Size No. 467, Table II.
- D. Mulch: Provide mulch in accordance with Sections 627 and 632 of the State Specifications.
- E. Bracing and Guying Materials: Provide bracing and guying materials in accordance with Section 632 of the State Specifications.
- F. Edging: Provide commercial hot-rolled steel edging plate, 4 inches wide and 1/8-inch thick. Fabricate edging in sections with loops pressed from or welded to the face of sections at 30-inch centers to receive 16-inch long tapered steel stakes. Provide edging finished with the manufacturer's standard paint.

2.7 TESTS

- A. Sample: Provide an approved independent laboratory testing facility and submit 10-ounce samples of the proposed topsoil to the approved independent laboratory testing facility in a sealed container for pH value.
- B. Analysis: Analyze topsoil samples as necessary to determine the amount of agricultural limestone, elemental sulfur or gypsum necessary and the appropriate fertilizer mix and quantity required for planting, seeding and sodding.
- C. Upon request by the RESIDENT PROJECT REPRESENTATIVE, submit samples of materials for inspection and acceptance.

PART 3 EXECUTION

3.1 GRADES

- A. General: Existing and final contours shown depict finished grades after completion of landscaping work after planting.

- B. Lawn Grades: Grade lawns to meet walks, curbs and adjoining surfaces after uniform settlement of surfaces. Correct water pockets or ridges which appear after surface settlement takes place on or before the end of the guarantee period.

3.2 EXCAVATION FOR PLANTING

- A. General: Obtain approval from the RESIDENT PROJECT REPRESENTATIVE for plant locations before excavation. Remove from site material that is surplus or unsuitable for backfill.
- B. Ground Cover and Grass Areas: Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil. Excavate for ground cover and grass areas to the required depths in accordance with the authority having jurisdiction or for grass to receive 6 inches of topsoil and for groundcover to receive 6 inches of planting soil. Remove debris and stones larger than one inch in dimension remaining on surface after tillage. Immediately prior to placing topsoil, scarify subgrade to a 3-inch depth for bonding of topsoil with subsoil.
- C. Plant Pits: Excavate plant pits or holes in accordance with Section 632 of the State Specifications.
- D. Drain: Install french drains for trees, ornamental trees, and evergreens planted on berms and other locations where the grade permits, from the bottom of the planting pit to the discharge at finished grade with a trench 9 inches wide and filled with a 6-inch thick layer of 3/4-inch washed gravel. Cover the gravel layer with a filter mat before backfilling the trench with soil.
- E. Over Drainage Courses: Place planting soil over drainage courses shown. Where subgrades pitch, vary bed depth of planting soil mix. Where tree pits are located in plant beds, excavate beds deep enough to accommodate not only the drainage course, but also the tree pit, including a layer of soil between bottom of the root ball and top of the drainage course.
- F. Water Retention and Dewatering: Excavation conditions causing water to be retained for more than 24 hours are not permitted. During excavation and until soil mix is placed and Work is complete, provide ample means and equipment with which to remove promptly and properly dispose of water entering an excavation or other part of the Work. Dispose of water pumped or drained from the Work in a suitable manner without damage to adjacent property or to other Work under construction. Do not place soil mix on areas where free water is standing on frozen subsoil areas.

3.3 SOIL CONDITIONING

- A. Disking: Before the application of topsoil, sodding or seeding, disk the area to be seeded, sodded or planted with groundcover to a depth of 6 inches. Continue the disking until the subsoil surface is sufficiently broken to provide a sufficient bond between subsoil and topsoil. Spread topsoil over the disked area to a uniform depth and density.
- B. Agricultural Limestone: Incorporate agricultural limestone, if required by the results of the soil test report, in accordance with Section 629 of the State Specifications into the upper 3 inches of planting soil. Uniformly spread fertilizer and mix into the soil to a depth of 1-1/2 inches or as recommended by the manufacturer.
- C. Soil Conditioning in Wetland, and Waterway Areas: Provide soil conditioning within and wetland waterway areas in accordance with Section 01 41 00.

3.4 SEEDING AND SODDING

- A. Seeding in Non-Wetland and Waterway Areas: Sow seed in accordance with Section 630 of the State Specifications and at the rate recommended by the seed producer and at a minimum rate of 2 pounds of seed per 1,000 square feet of area. Evenly rake the surface after seeding with a fine-tooth rake. Mulch newly seeded areas in accordance with Section 627 of the State Specifications. Place seed within 1 day of topsoil placement.
- B. Seeding in Wetland and Waterway Areas: Provide seeding within and wetland waterway areas in accordance with Section 01 41 00.
- C. Sodding: Lay sod in accordance with Section 631 of the State Specifications in such a manner that the surface is smooth and even and all edges abut one another tightly. Water and roll sod so that a bond is produced between the prepared topsoil and the sod. On slopes greater than 4 to 1, stake installed sod with approved wooden sod stakes.

3.5 PLANTING

- A. Layout: Outline and stake locations for trees, shrubs, evergreens and bed for approval. Obtain approval for location from RESIDENT PROJECT REPRESENTATIVE prior to commencing planting operations.
- B. Setting Plants: Set plants in accordance with Section 632 of the State Specifications. Set plants plumb and straight with the crown at finished grade. Compact soil around the base of the ball, and fill the void 2/3 of the way up from the bottom. Water each plant immediately. After the water has completely drained, fill the plant pits to finished grade. Properly spread out roots of bare root plants and carefully work topsoil among them. Cut off broken or frayed roots with a clean cut. Form a narrow

basin, the size of the ball with a ridge of soil to facilitate watering. After that operation is completed, apply a second watering immediately. Finish planting pits and beds within a period of 3 days following start of installation. Construct tree saucers, and cultivate and outline planting pits with a neat edge.

- C. Mulching: Provide mulching on plantings in accordance with Section 632 of the State Specifications. Immediately after planting operations are completed, cover all tree and shrub pits with mulch to a minimum depth of 3 inches. Limit mulch for trees to saucer diameter and, for shrubs, the entire shrub bed.
- D. Pruning: Provide pruning in accordance with Section 632 of the State Specifications. Prune each tree and evergreen with clean, sharp tools in accordance with standard horticultural practice to preserve the natural character of the plant. Remove suckers and dead, broken or badly bruised branches.
- E. Wrapping: Wrap trees in accordance with Section 632 of the State Specifications. Wrap the tree trunks with wrapping material securely tied with biodegradable tie or tape at top and bottom and at 2-foot intervals along the trunk but no less than a minimum of three places, including the top, middle, and bottom. Overlap the wrapping 2 inches top and bottom and entirely cover the trunk from the ground to the height of the second branch, neat and snug.
- F. Bracing: Brace trees in accordance with Section 632 of the State Specifications.
- G. Guying: Guy trees as necessary to be plumb and straight through final inspection in accordance with Section 632 of the State Specifications. Remove guy wires at completion and acceptance of landscaping.
- H. Watering: Thoroughly saturate the soil around each plant with water during planting and as many times later as seasonal conditions require until the end of the guarantee period.
- I. Weed Barrier Fabric: Provide weed barrier fabric before placing mulch and in accordance with Section 632 of the State Specifications.

3.6 EDGING

- A. General: Establish a neat edge where planting areas meet grass areas, with spade or edging tools, immediately after planting and seeding is completed. Establish flowing curves as shown. Maintain edging until the end of the guarantee period.

3.7 GRAVELED AREAS

- A. General: Lay a weed barrier in accordance with the manufacturer's recommendations and top with a 4-inch layer of gravel. Edge graveled areas with metal edging.

3.8 CLEANING

- A. Disposal of Materials: Remove and legally dispose off-site excavated material and fill material in excess of required volumes, including excess topsoil, supplemental topsoil, and soil mix materials.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 32 95 00

TRAFFIC CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirement for providing traffic control in accordance with Section 643 of the State Specifications, MUTCD, as shown and as specified. The Work includes, but is not limited to the following items:
1. Designate an individual responsible for traffic control maintenance including access of local traffic, and 24-hour emergency traffic control repair. Provide the name and telephone number of this individual to the RESIDENT PROJECT REPRESENTATIVE
 2. Comply with Laws and Regulations regarding closing or restricting use of public streets or highways. Do not close any public or private road, except by written permission of proper authority. Ensure the least possible obstruction to traffic and normal commercial pursuits.
 3. Provide, install, and remove "No Parking Zone" signs as needed and in accordance with the authority having jurisdiction. Consider no parking zone signs incidental to the Maintenance of Traffic contract item.
 4. Conduct the Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
 5. The CONTRACTOR will only be able to access the construction zone adjacent to I-43 off of Racine Court, Martin Road and Calhoun Road. There is no closing of any portion of I-43, no access off I-43 or any traffic control on I-43.
 6. Whenever it is necessary to cross, close, or obstruct roads, driveways, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.
 7. Maintenance of traffic is not required if CONTRACTOR obtains written permission from property owner or tenant of private property, or from authority having jurisdiction over public property involved, to obstruct traffic at designated point.
 8. Maintain top of backfilled trenches with steel plates or a minimum of 2-inches of HMA to allow normal vehicular traffic to pass over. Provide

temporary access driveways where required. Provide cleanup operations following immediately behind backfilling.

9. Flagging operations may be permitted on Sentry Drive and West Avenue, with prior approval from the authority having jurisdiction of the road. The work zone is limited to 750 feet when flagging is utilized for traffic control. Any cross street within a flagged roadway segment must also be flagged.
10. When flaggers and guards are required by regulation or when deemed necessary for safety, furnish flaggers and guards with approved orange wearing apparel and other regulation traffic control devices.
11. Provide temporary pavement marking in accordance with Section 649 of the State Specifications. Consider temporary pavement marking incidental to Maintenance of Traffic contract item .
12. Provide snow removal to facilitate normal vehicular traffic on public or private roads affected by construction. Provide snow removal of traffic lanes prior to reopening to vehicular traffic. Perform snow removal promptly and efficiently by means of suitable equipment whenever necessary for safety, and as may be directed by proper authority.
13. Notify fire department and police department before closing streets or portion thereof. Notify said departments when streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial crossings or dead-end streets, without written permission from fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access.
14. Coordinate with SPX Transformer Solutions, Inc., 400 S. Prairie Avenue, Waukesha, WI 53186, on their oversized overweight haul schedule. The SPX Transformer Solutions, Inc. contact is Andrea Zangerle, (262) 446-8591.
15. Coordinate with Weldall Manufacturing, Inc., 2001 S Prairie Avenue, Waukesha, WI 53189, on their trucking and oversize overweight haul schedule. The Weldall Manufacturing, Inc. contacts are Keith Payne, Traffic Supervisor, (262) 522-1927 and David Bahl, Plant Manager, (262) 544-1155 ext. 107.
16. Provide up to 1000 days of Portable Changeable Message Signs (PCMS) to be located as directed by the RESIDENT PROJECT REPRESENTATIVE. Consider the 1000 days of PCMS incidental to Maintenance of Traffic contract item.
17. Coordinate your work in accordance to state standard spec 105.5. Modifications to the traffic control plan may be required by the engineer to be safe and consistent with adjacent work by others. It is expected that

routine maintenance by the city and county personnel may be required at certain times concurrently with the work being done under this contract. The following contracts are anticipated to be under construction within the time period of this contract:

- a. Waukesha Water Utility Contract Package 6. The GWA contacts are James Cobb, Construction Manager, (616) 706-4600, CobbJR@bv.com and Jeff Champion, Construction Manager, (616) 430-2578, ChampionJA@bv.com.
- b. Contract ID 2718-15-70 STH 164, CTH ES to Les Paul Parkway. The WisDOT contact is John Kanzenbach; john.kanzenbach@dot.wi.gov, (262) 548-6467
- c. Contract ID 1090-35-70 I-43, STH 164 to Beloit Road. The WisDOT contact is Lance Parve; lance.parve@dot.wi.gov, (414) 750-1330 or Brian Boothsby; brian.boothsby@dot.wi.gov, (414) 416-9536.
- d. Contract ID 2040-15-60 HWY 100, S 60th Street to Loomis Road. The WisDOT contact is Robert Bellin; robert.bellin@dot.wi.gov, (262) 521-4405, (414) 750-3384.
- e. Contract ID 2782-03-76 CTH O, IH-43 WB Ramp to Beloit Road. The WisDOT contact is Kathy Kramer, Kathleen1.Kramer@dot.wi.gov, 262-548-8772.
- f. Contract ID 2773-05-71 CTH D from Calhoun Road to E County Line. The WisDOT contact is Kathy Kramer, Kathleen1.Kramer@dot.wi.gov, 262-548-8772.
- g. Contract ID 2410-03-71 W National Avenue, S 82nd Street to S 76th Street. The WisDOT contact is Kathy Kramer, Kathleen1.Kramer@dot.wi.gov, 262-548-8772.
- h. S Wehr Road south of Coffee Road. The City of New Berlin contact is Steve Brooks, sbrooks@newberlin.org, 262-780-4609.
- i. Calhoun Road, Beloit Road to National Avenue. The City of New Berlin contact is Steve Brooks, sbrooks@newberlin.org, 262-780-4609.
- j. S Ann Louise Drive east of CTH Y. The City of New Berlin contact is Steve Brooks, sbrooks@newberlin.org, 262-780-4609.
- k. Small Road, College to Westridge. The City of New Berlin contact is Steve Brooks, sbrooks@newberlin.org, 262-780-4609.

- l. Contract ID 2773-10-70 WIS 59, East Waukesha Bypass, Sunset Drive to Arcadian Avenue. The WisDOT contact is Kathy Kramer, Kathleen1.Kramer@dot.wi.gov, 262-548-8772.
- m. The City of Waukesha contact for traffic control and other general project issues is Jon Weil, P.S., jweil@waukesha-wi.gov, 262-524-3599.
- n. The City of Waukesha contact for the City Drop Off Center and garbage pickup is Dustin Nolan, dnolan@waukesha-wi.gov, 262-524-3593.

18. Road Closures:

- a. Notify the RESIDENT PROJECT REPRESENTATIVE if there are any changes in the schedule, early completions, or cancellations of scheduled work. Coordinate the locations and messages of portable changeable message signs with the RESIDENT PROJECT REPRESENTATIVE. Obtain acceptance from the RESIDENT PROJECT REPRESENTATIVE regarding wording of all messages on portable changeable message signs prior to placing the message. Notify the RESIDENT PROJECT REPRESENTATIVE of proposed changes for detours and provide a revised signing plan for review by and approval of the RESIDENT PROJECT REPRESENTATIVE.
- b. Provide the RESIDENT PROJECT REPRESENTATIVE with a schedule of lane and road closures 14 days in advance for incorporation into the Wisconsin Lane Closure System.
- c. Invite local agencies, emergency first responders, Milwaukee County Transit, Waukesha County Transit, Waukesha Metro Transit, and other project stakeholders identified by the RESIDENT PROJECT REPRESENTATIVE to regularly scheduled meetings to announce work zone locations, roadway closures, and changes to traffic patterns.
 - a. All roadway closures shall be posted a minimum of 5 days in advance of their closure with dates and time of closure.
 - b. No closures are allowed on active detour routes. No closures are allowed on roads that are not physically affected by the pipe installation.
 - c. The following roads can be closed at Sentry Drive for up to 2 consecutive calendar days:
 - (1) Chapman Drive
 - (2) Spring City Drive

- d. The following roads can be closed at Sunset Drive for up to 2 consecutive calendar days:
 - (1) Center Road
 - (2) Prairie Avenue
 - (3) Industrial Lane
- e. The following roads can be closed at West Avenue for up to 2 consecutive calendar days:
 - (1) Freeman Street
 - (2) Baird Street
 - (3) Richard Street
 - (4) Debbie Street
 - (5) Dodie Street
 - (6) Sentinel Drive
 - (7) Darlene Drive
- f. The following roads can be closed at Racine Avenue/CTH Y for up to 2 consecutive calendar days:
 - (1) Swartz Road
 - (2) Mill Creek Trail
 - (3) Pinewood Drive
- g. Access must be maintained for the following roads:
 - (1) S Racine Court
 - (2) Hickory Trail
 - (3) Julius Heil Drive
- h. The following closures to thru traffic, detours and duration limitations apply:
 - (1) S Sentry Drive full closure from W. Sunset Drive to 200' north (STA 10+00 to STA 12+00) utilizing detour for 5 consecutive

calendar days for the construction at the intersection with W. Sunset Drive.

- (2) S. West Avenue full closure utilizing detour for 8 consecutive calendar days for the construction from 72'WA'+00 to 77'WA'+00. Coordinate closure with adjacent businesses.
- (3) S. West Avenue full closure from STA 36+00 to STA 40+00 utilizing detour for 5 consecutive calendar days for the construction of the crossing at the intersection with STH 59.
- (4) Lawnsdale Road/CTH I full closure utilizing detour for 3 consecutive calendar days.
- (5) Racine Avenue/CTH Y a single full closure from 11:00 pm Friday until the following Monday at 5:00 a.m. utilizing detour for the crossing at station 137'RA'+00. A rental charge of \$4,000 an hour will be assessed for closure of CTH Y beyond the time listed. Assessments will be administered via deduction made from the monies due to the contractor based on the hourly rental rate. The engineer, or designated representative, will be the sole authority in determining time period length for the rental charge. Rental will not be assessed for closures due to crashes, accidents or emergencies.
- (6) Racine Avenue/CTH Y a single full closure from 11:00 pm Friday until the following Monday at 5:00 a.m. utilizing detour for the crossing at station 158'RA'+00. A rental charge of \$4,000 an hour will be assessed for closure of CTH Y beyond the time listed. Assessments will be administered via deduction made from the monies due to the contractor based on the hourly rental rate. The engineer, or designated representative, will be the sole authority in determining time period length for the rental charge. Rental will not be assessed for closures due to crashes, accidents or emergencies.
- (7) Racine Avenue/CTH Y southbound closure utilizing Detour for 8 consecutive calendar days for the construction from 125'RA'+00 to 132'RA'+00. A rental charge of \$20,000 a day will be assessed for closure of CTH Y beyond the time listed. Assessments will be administered via deduction made from the monies due to the contractor based on the daily rental rate. The engineer, or designated representative, will be the sole authority in determining time period length for the rental charge. Rental will not be assessed for closures due to crashes, accidents or emergencies.

- (8) Racine Avenue/CTH Y southbound closure utilizing Detour for an additional 26 consecutive calendar days for the construction from 62'RA'+00 to 88'RA'+00. A rental charge of \$20,000 a day will be assessed for closure of CTH Y beyond the time listed. Assessments will be administered via deduction made from the monies due to the contractor based on the daily rental rate. The engineer, or designated representative, will be the sole authority in determining time period length for the rental charge. Rental will not be assessed for closures due to crashes, accidents or emergencies. Racine Avenue/CTH Y southbound closure utilizing Detour for an additional 20 consecutive calendar days for the construction from 42'RA'+00 to 62'RA'+00. A rental charge of \$20,000 a day will be assessed for closure of CTH Y beyond the time listed. Assessments will be administered via deduction made from the monies due to the contractor based on the daily rental rate. The engineer, or designated representative, will be the sole authority in determining time period length for the rental charge. Rental will not be assessed for closures due to crashes, accidents or emergencies.
 - (9) Martin Road full closure utilizing detour for 2 consecutive calendar days.
 - (10) Calhoun Road full closure utilizing detour for 2 consecutive calendar days.
 - (11) Small Road full closure utilizing detour for 2 consecutive calendar days.
- i. The following lane closure and durations limitations apply:
- (1) Sentry Drive may be restricted to one lane in each direction for 50 days adjacent to the work zone. Wednesdays and Saturdays there cannot be a work zone both north and south of the Waukesha Drop Off Center. When a work zone is north of the Waukesha Drop Off Center, provide 3 lanes south of the Waukesha Drop Off Center, with the center of the 3 lanes as a northbound left turn lane into the Waukesha Drop Off Center. When a work zone is south of the Waukesha Drop Off Center, provide 3 lanes north of the Waukesha Drop Off Center with a southbound right turn lane into the center. Drop Off Center turn lanes to be 1000 feet or as directed by the Resident Project Representative. Provide portable changeable message signs to direct customers to cue in provided turn lanes. Coordinate Drop Off Center sign message with Dustin Nolan/City of Waukesha 262-524-3593.

- (2) West Sunset Drive may be restricted to one lane in each direction for 32 consecutive calendar days.
 - (3) Les Paul Parkway/WIS 59/WIS 164 may be restricted to one westbound lane for 70 consecutive calendar days.
 - j. Maintain access to at least two of Center Road, Prairie Avenue, Industrial Lane. Do not close more than one at any time.
 - k. Do not close Chapman Drive and Spring City Drive concurrently.
 - l. Maintain a minimum of one driveway to the City of Waukesha garage from Sentry Drive. Closure of the fuel pump driveway is limited to a maximum of one (1) working day. Coordinate City of Waukesha garage driveway closures with Brian Knapp, 414-507-1132.
 - m. Do not close more than two consecutive roads along West Avenue from Freeman Street to Darlene Drive.
 - n. Maintain a minimum of two access points to Walmart along West Avenue.
 - o. Maintain access to the Park and Ride lot located along northbound Racine Avenue/CTH Y north of IH 43.
- B. Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:
- 1. Section 01 33 00 – Submittals
 - 2. Section 01 73 29 - Cutting and Patching
 - 3. Section 32 12 00 - Asphalt Paving
 - 4. Section 32 13 00 - Concrete Paving

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
- 1. Federal Highway Administration (FHWA), Manual of Uniform Traffic Control Devices (MUTCD)
 - 2. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, including the supplemental specifications and recurring special provisions, referred to as the “State Specifications”.

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings
 - 1. Name and telephone number of the individual responsible for traffic control maintenance, including access of local traffic and 24-hour emergency traffic control repair.
 - 2. A look-ahead schedule, 3 weeks in advance for anticipated closures.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide traffic control items adhering to MUTCD and the State Specifications.

PART 3 EXECUTION

3.1 NOT USED

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 33 05 22

HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for construction of pipelines under bodies of water, wetlands, or other obstructions using horizontal directional drilling (also referred to as “HDD”).
- B. Related Work Specified In Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 01 45 50 - Leakage Tests
 - 2. Section 31 23 16 - Excavation
 - 3. Section 31 41 00 - Shoring, Sheeting and Bracing
 - 4. Section 33 05 23 - Jacking, Augering and Mining
 - 5. Section 33 05 50 - Laying and Jointing Buried Pipelines
 - 6. Section 33 05 53 - Buried High Density Polyethylene Pipe and Fittings
 - 7. Section 33 05 70 - Locating Buried Pipelines

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ANSI S1.4 - Specification for Sound Level Meters
 - 2. API - Specification for Oil Well Drilling Fluids Material Specification 13A
 - 3. ASTM F1962 - Standard Guide for Use of Maxi-Horizontal Directional Drilling Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings
 - 4. HDD - Horizontal Directional Drilling, Good Practices Guidelines Consortium
 - 5. ISO 3740 - Acoustics – Determination of Sound Power Levels of Noise Sources – Guidelines for the Use of Basic Standards
 - 6. ISO 3744 - Acoustics – Determination of Sound Power Levels and Sound Energy Levels of Noise Sources Using Sound

Pressure – Engineering Methods for an Essentially Free
Field Over a Reflecting Plane

1.3 SYSTEM DESCRIPTION

- A. Provide pipe installed via HDD to the line and grade and within the right-of-way or easements as shown or specified.
 - 1. Take responsibility for the design and adequacy of HDD installation details and methods not shown or specified.
 - 2. Rock, including cobbles, boulders, bedrock, and other similar materials have the potential of being encountered along the pipeline alignment. Assure the practicality and feasibility of the HDD installation method based on the available soil and subsurface data. Take responsibility for obtaining additional soil and subsurface data through borings, test pits, or other means along the pipe alignment necessary to design the proposed HDD installation. The presence of rock, including cobbles, boulders, bedrock, and other adverse subsurface conditions will not warrant an increase in the Total Computed Price.
 - 3. Determine zone of influence, safe burial depth, and offset from existing utilities while considering drilling fluid pressure, drilling equipment, existing utility materials, and soil conditions. Assure that alignment shown provides sufficient burial depth and offset to prevent leakage to adjacent utilities or surface, or propose modifications to alignment in submittals.

1.4 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings, Product Data, and Information:
 - 1. Working drawings and technical specifications of the following items:
 - a. Equipment and materials, including truck, drilling and pulling equipment, mud-mixing and recycle units, drilling fluid, power unit, drill pipe or sections, boring head, water pumps, slurry tanks, slurry pumps, holding and separation tanks, and filtration systems. Include size, capacity, and modifications in technical specifications of equipment.
 - b. Layout of pipe and staging areas and spacing of support rollers.
 - c. Plan and profile of the proposed pilot drilling hole alignment, including entry and exit points and angles, and radius of curvature.

- d. Grouting techniques, including equipment, pumping procedures, pressure grout types, mixtures and plug systems.
 - e. Muck removal, including equipment type, number, and disposal location.
 - f. Procedures for controlling and checking line and grade.
 - g. Method for detecting surface movement.
 - h. Hazardous chemical list and Material Safety Data Sheets (MSDS) for drilling fluid compounds and other such items.
 - i. Method of construction, schedule, and the sequence of operations.
2. Supplemental subsurface soil condition investigations, including additional borings and soil analysis, if applicable.
 3. Notification 48 hours in advance of each phase of Work for HDD.

C. Quality Control:

1. A certificate signed and sealed by a Licensed Professional Engineer experienced in HDD and registered in the State of Wisconsin that certifies that the Licensed Professional Engineer has evaluated and approved the CONTRACTOR's HDD plan and has prepared complete design calculations and working drawings for the HDD, not specifically shown on the Drawings. Attest that the pipe wall thickness proposed is adequate for the HDD installation proposed. Provide a separate certificate for each HDD.
2. An affidavit indicating experience in accordance with the requirements of this Section.
3. Plan and profile of the actual pilot hole installed. Obtain approval prior to beginning reaming and pullback of the joined pipe string.
4. Field forms or bore logs for establishing and checking line and grade and pullback pressures.
5. Mitigation plan for critical phases and areas of HDD and potential operation induced damages to adjacent utilities or structures, including settlement, frac out, heave, and fluid leak and spills. Include provisions for containment of fluids and slurries from entering wetland jurisdictional limits shown during and after rainfall events.
6. Letters of notification to other utilities within the limits of construction.

7. Evidence of OSHA certification for the Site Safety Representative.
8. Daily logs of construction events and observations that include job, date, time, pipe length installed, location and elevation of significant soil strata boundaries and brief soil descriptions, and the following parameters every 15 minutes throughout each drill pass, back ream pass, or pipe installation pass: drilling fluid pressure, drilling fluid flow rate, drill thrust pressure, drill pullback pressure, drill head torque, mud flow rate, and pulling forces.
9. A Boring Path Report within 14 days of the completion of the bore path in accordance with the requirements of this Section.

1.5 QUALITY ASSURANCE

- A. Experience Requirements: Utilize a HDD contractor with experience completing a minimum of two horizontal direction drill projects in the last 2 years of 16-inch diameter pipe or larger with minimum single pull length of 750 feet each. Operate HDD equipment using workers experienced in HDD operations.
- B. Safety Requirements: Whenever there is an emergency or stoppage of Work which is likely to endanger the excavation or adjacent structures, utilize a full work crew non-stop for 24 hours per day, 7 days per week, including weekends and holidays, until the emergency or hazardous conditions no longer jeopardize the Work and the health and safety of the general public and personnel involved in the HDD Work.
- C. Environmental Protection:
 1. Comply with Federal, State and local laws and regulations.
 2. Make adequate provisions for handling the drilling fluids, water, mud, slurry, and cuttings at the entry and exit pits. Do not discharge these fluids to waterways, wetlands, water bodies or to the land areas involved during the construction process. When provisions for storage of drilling fluids, water, mud, slurry, or cuttings on site are exceeded, haul and dispose of these materials off-site. Do not discharge spoils to sewers or storm drains.
 3. Take responsibility for environmental damage and cleanup due to discharges of slurry or other causes.
 4. Place a silt fence between drilling operations and drainage, wetland, waterway or other area designated for such protection as shown or specified or required by Federal, State and local laws and regulations. Provide additional environmental protection necessary to contain hydraulic or drilling fluids spills, including berms, liners, turbidity curtains, floating silt barriers and other measures.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products and materials as specified in Division 1 and Section 33 05 50.

PART 2 PRODUCTS

2.1 MATERIALS

- A. High Density Polyethylene Pipe and Fittings: Provide HDPE pipe and fittings as shown and in accordance with Section 33 05 53.
 - 1. Provide thicker wall than shown or specified if required as determined by the CONTRACTOR's Licensed Professional Engineer registered in the State of Wisconsin for the HDD installation at no additional cost to the OWNER, considering design criteria for the installation, including the following items, and as recommended by the manufacturer. Supplement the following design criteria for factors of safety, friction factors, and other items to determine wall thickness as necessary. Consider pre-installation, installation, and post-installation loading conditions.
 - a. Proposed radius of curvature and resulting pull stress.
 - b. Buckling, considering dead load equivalent to the depth of cover shown, internal vacuum, HS-20 loading, and hydrostatic load over top of pipe to grade.
 - c. Working pressure equivalent to the test pressure specified in Section 33 05 50.
 - d. Surge pressure equivalent to the working pressure with the addition of 100 psi.
- B. Tracer Wire: Provide tracer wire in accordance with Section 33 05 70.

2.2 EQUIPMENT

- A. General: Use equipment in sound operation with adequate capacity, stability, and safety features in satisfactory working condition required for accomplishing the Work without evidence of undue stress or failure.
 - 1. Use equipment in conformance with applicable Federal, State and local laws and regulations and safety requirements.
 - 2. Employ equipment that is capable of handling the various anticipated ground conditions and is capable of:

- a. Minimizing loss of earth material ahead of and around the machine and providing satisfactory support of the excavated face at times.
 - b. Indicating whether the amount of earth material removed is equivalent to that displaced by the advance of the machine such that the advance rate may be controlled accordingly.
3. Provide adequate secondary containment for portable storage tanks.
4. Use grips, pulling heads, and swivels compatible with the pipe material and designed to transmit the maximum rated pullback force of the equipment used without distortion. Use grips, pulling heads, and swivels designed for HDD applications.

B. Directional Drilling System:

1. General: Accomplish drilling with fluid-assist mechanical cutting. Use a mobile directional drilling system with small diameter fluid jets to fracture the soil and mechanical cutters to cut and excavate the soil as the head advances forward consisting of a road transportable field power unit, mud-mixing and recycling unit, a trailer or carriage mounted drill unit, and other appurtenant equipment necessary and capable of drilling the length as shown or specified in a single bore.
 - a. Use drilling equipment with a maximum sound power level of 72 decibels as defined in ANSI S1.4 at 10 feet from the equipment. Measure sound power level in accordance with ISO 3740 and ISO 3744. Diesel, electrical, or air-powered equipment is acceptable, subject to applicable Federal, State and local laws and regulations.
 - b. Ground, protect, and operate drilling equipment in accordance with the manufacturer's requirements for electric strike safety.
 - c. Water sluicing methods, jetting with compressed air, or boring and tunneling devices with vibrating type heads, and other methods that do not provide positive control of line and grade are not allowed for use on this Project.
2. Mud-Mixing and Recycling Units: Use a self-contained mud-mixing and recycle unit with a fluid storage tank, high pressure cutting fluid pumping system, and a complete bentonite and drilling fluid additive mixing system designed to provide a supply of high-pressure bentonite based cutting fluid to the drill unit capable of making changes to bentonite and drilling fluid additive concentrations during drilling in response to changing soil conditions. Use recycle unit designed to minimize the production of new cutting fluid and maximize reuse and recirculation of original cutting fluid produced to minimize spillage.

3. Drilling Fluid: Use drilling fluid consisting of a mixture of bentonite slurry with formula designed for conditions anticipated for each HDD meeting the requirements of API Specification 13A with polymers and additives as required mixed on-site that are inert and pose no environmental risk. Use bentonite sealants and water to lubricate and seal the mini-tunnel. Obtain, transport, and store water required for drilling fluids.
4. Drill Unit: Use a drill unit of either the trailer or carriage mounted type designed to rotate and push hollow drill pipe or sections into the tunnel being created by the boring head.
5. Drill Pipe or Sections: Use drill pipe or sections of high strength S-grade steel with sufficient strength to withstand the maximum rated pullback and pushing load of the drilling equipment that permits bending to the radius of curvature required without yielding. Use drill pipe joints and end fittings that are flush and capable of transmitting the maximum rated torque, pressure, and lineal load requirement of the drilling system.
6. Boring Head: Use a boring head capable of housing a probe used by the Magnetic Guidance System.
7. Tracking Equipment: Use a Magnetic Guidance System, including probe, accelerometers, magnetometers, connector wire, interface, computer, printer, software, and power source capable of determining boring head face depth and location from surface, azimuth, and inclination and to orient the head for steering to an accuracy within 2 percent of the vertical depth and within 1 percent of the horizontal bore length such that the difference between the actual depth and machine calculated depth is not more than 1 foot per 100 feet.
8. Steering: Use instrumentation and mechanical and hydraulic deviation equipment to change the boring course capable of exiting the ground within 1 foot of the design location. Provide steering by an offset section of drill stem that causes the cutterhead to turn eccentrically about its centerline when rotating. When steering adjustments are required, rotate the cutterhead offset section toward the desired direction of travel and advance the drill stem forward without rotation. A walkover tracking system is not permitted.
9. Alarm System: Fit drilling equipment with permanent alarm system capable of detecting electric current that produces an audible alarm when the drill head nears electrified cables.
10. Control Console: Use a control console with a calibrated display to monitor the location and orientation of the boring head assembly with a wire line

tracking system along a predetermined course that displays inclination, azimuth, tool face location, mud pump rates, and torque pressures.

11. Spoils Equipment: Use cutting removal system with self-contained vacuum truck of sufficient capacity to dispose of excess fluid cutting mixture and cuttings off-site.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Perform HDD as determined by the CONTRACTOR's Licensed Professional Engineer registered in the State of Wisconsin, as recommended by the pipe and equipment manufacturers, and in conformance with the Horizontal Directional Drilling, Good Practices Guidelines by the HDD Consortium and ASTM F1962.
 1. Obtain authorization in writing to begin HDD from RESIDENT PROJECT REPRESENTATIVE.
 2. Identify and verify location, depth, and size of existing underground utilities, structures, and facilities in the vicinity of the HDD installation that may interfere with the Work. Repair or replace utilities, structures, or facilities damaged by construction in accordance with the requirements of Section 33 05 50.
 3. Do not cause leakage to adjacent utilities due to any cause, including drilling fluid pressure in the borehole. Maintain minimum pressures and flow rates during the drilling operation so as not to fracture the sub-grade material around or above the bore. Repair related damages.
 4. Monitor ground surface or waterway crossing within vicinity of HDD for evidence of fluid fracture. In the event of fluid fracture, inadvertent returns, or loss during pilot hole drilling operations, stop drilling, wait 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a Marsh funnel and then wait another 30 minutes. If mud fracture return loss continues, do not proceed drilling operations and notify the RESIDENT PROJECT REPRESENTATIVE in writing. Proceed with the Work as authorized by the RESIDENT PROJECT REPRESENTATIVE in writing.
 5. Monitor and maintain line and grade using techniques of creating or directing a borehole along a predetermined path to a specified target location.

6. Monitor nearby utilities within the zone of influence of construction (depending on the depth and diameter of the HDD hole) prior to construction to establish baseline conditions and during construction to adjust the operation and avoid damages.
7. Install the pipe in a manner that does not cause upheaval, settlement, cracking, movement, or distortion of structures or surface features, including bridge walls, rock and concrete retaining walls, channel bottoms, and other structural improvements.
8. If during an installation an obstruction is encountered which prevents installation of the pipe in accordance with the requirements of this Section, the pipe may be withdrawn by the CONTRACTOR upon the approval of the RESIDENT PROJECT REPRESENTATIVE in writing, and the bore path immediately filled with an approved material. Furnish submittals for a new installation and obtain approval before resuming the Work.
9. Protect new pipe and fittings to prevent scarring or gouging of the pipe or components. Take appropriate steps during pullback to install the HDPE pipe without damage. If the pipe is buckled or otherwise damaged, remove and replace the damaged section at no additional cost to the OWNER. Replace or repair rejected pipe, fittings, or joints in accordance with the requirements of Section 33 05 53.

B. Pilot Bore:

1. Drill pilot hole along the alignment shown and as follows:
 - a. Construct a pilot bore at least 6 inches in diameter at the centerline alignment and grade as shown. Drill pilot hole vertically and horizontally as follows:
 - (1) Vertical: Provide cover or clearance below channels or between existing utilities as shown or approved in writing.
 - (2) Horizontal: Within 2 feet of the centerline shown.
 - (3) Obtain authorization in writing from RESIDENT PROJECT REPRESENTATIVE for deviation beyond these tolerances and revise and resubmit certificate signed and sealed by a Licensed Professional Engineer experienced in HDD and registered in the State of Wisconsin in accordance with the requirements of this Section.
2. Control the pilot bore and reaming procedure by a Magnetic Guidance System, while circulating drilling fluids to maintain an open bore.

3. If the path of the pilot bore is successfully completed, then proceed with reaming and installing pipe. If the pilot bore is not successfully completed, then do not proceed with the reaming procedure until so authorized in writing.
4. Utilize a full tail pipe upon completion of the initial pilot hole when back reaming. Protect the pilot hole from loss or collapse by the presence of the drill stem and tail pipe along the entire length of the pilot hole until installation of final HDPE pipe.

C. Pipework and Joining:

1. Provide alignment survey and layout HDPE pipe as specified in Division 1 and Section 33 05 53.
2. Haul, string, and join pipe in accordance with the requirements of Section 33 05 50, Section 33 05 53, and as follows:
 - a. Use adequate support rollers as recommended by the pipe manufacturer to prevent overstressing the pipe while maintaining a free stress arc along the string of joined suspended pipe during pullback of the string within the manufacturer's limits. Use support rollers comprised of a non-abrasive material that will not damage the pipe or tracer wire.
 - b. Join pipe in a manner that does not obstruct adjacent roads, or public activities adjacent to the laydown areas.
 - c. If sufficient laydown area is available, join the entire length of pipe to be pulled through bore prior to commencement of pullback operation. Test joined pipe for leaks in accordance with Section 01 45 50 prior to pullback.
 - d. If sufficient laydown area is not available, assemble finished pipeline in as few sections as possible. Test each joined pipe section for leaks in accordance with Section 01 45 50 and join each pipe section to the previous section prior to pullback. Take responsibility for using a drill rig with adequate pullback capacity to overcome increased frictional resistance resulting from stoppage of pipe pullback required to join pipe sections.
3. Close off lines when pipe laying is not in progress in accordance with the requirements of Section 33 05 50.

D. Reaming and Pipe Installation:

1. Enlarge pilot hole as necessary to a minimum of 1.5 times the nominal diameter of the pipe and pullback the joined pipe string.
 - a. Use the type of hole opener or back reamer adequate for the types of subsurface soil conditions encountered during the pilot hole drilling operation. An undersized reamer is not permitted.
 - b. Supply portable mud tanks and construct temporary mud pits to contain excess drill fluids and slurry material displaced during reaming and pipe installation. Do not allow unauthorized access to mud pits. Secure or stabilize mud pits against surface water runoff and containment berm failure. Dispose of drill cuttings and excess fluids off-site.
 - c. Keep the lead end of the pipe closed during the pullback operation.
 - d. Use swivel to connect the HDPE pipe and tracer wires to the drill pipe to minimize rotation of the pipe during pullback and prevent torsional stresses from occurring in the pipe. Utilize lubricated internal bearings for swivel without external contamination or over lubrication.
 - e. Pullback pipe in one continuous installation at a smooth and constant speed until the pipe is in final position.
 - f. During pullback, continuously measure the maximum pull (axial tension force) exerted on the HDPE pipe and limit to within the manufacturer's maximum recommended value so that the pipe or joints are not overstressed. Monitor support roller operation and sidebooms to assist movement of the HDPE pipe.
 - g. Do not exceed five percent strain on HDPE pipe during pullback.
2. Use potable water for countering pipe flotation.
3. Not less than 24 hours after the installation is complete, inject approved low strength cement slurry or flowable fill with cement into the annular space around the installed pipe approximately 50 feet at each end of the drilled pipe. Allow the fill to overflow into a containment area. Where cement slurry cannot be used, provide restraint at both ends of pipe to hold pipe in place as approved or authorized in writing by the RESIDENT PROJECT REPRESENTATIVE.
4. Following installation, backfill excavations and provide surface restoration as shown or specified.

5. Provide excavation in accordance with Section 31 23 16. Provide sheeting, underpinning, cribbing, and other related items necessary to support structures or facilities affected by the HDD operations or as otherwise required and in accordance with Section 31 41 00.
 6. Use a sufficient relaxation period, as recommended by the pipe manufacturer, after the pipe is completely pulled through the bore hole and prior to the final pipe tie-in.
- E. Boring Path Report: Maintain a Boring Path Report during installation recording alignment reading every 5 feet showing horizontal position (x, y) referenced to the drilled entry point, which accurately describes the location of the pilot hole, the drilled exit point, the transition points between pipe material changes, and the lowest point of the pilot hole. Show data on a dimensionally correct copy of the Drawings indicating horizontal and vertical locations at each end of the bore and at intervals of 50-foot maximum in between. Provide azimuth reading where direct overhead readings are not possible. Include project name, project location, crossing name, station, identification of drilling method used, and name, title, and company name of person collecting the data in the report.

3.2 FIELD QUALITY CONTROL

- A. Cleaning: Use cleaning pigs to remove residual water and debris. After the cleaning operation, provide and run a sizing pig to check for abnormalities in the form of buckles, dents, excessive out-of-roundness, and other deformations in the presence of the RESIDENT PROJECT REPRESENTATIVE. Confirm that no sharp anomalies exist (e.g. dents, buckles, gouges, and internal obstructions) greater than 2 percent of the nominal pipe diameter, or excessive out-of-roundness greater than 5 percent of the nominal pipe diameter. Dent locations for gauging purposes are those defined above which occur within a span of 5 feet or less. Measure pipe out-of-roundness as the percent ovality as specified in Section 33 05 23. For gauging purposes, out-of-roundness locations are those defined above which exceed a span of 5 feet. Replace or repair rejected pipe.
- B. Testing: Test the installed in place pipe for leaks prior to final acceptance in accordance with Section 01 45 50.
1. If the pipe does not pass the pressure test after installation, then remove the entire pipe from the bore hole, repair the pipe, and perform pressure testing prior to reinstalling the pipe and again after reinstallation, at no additional cost to the OWNER.

END OF SECTION

SECTION 33 05 23

JACKING, AUGERING AND MINING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing carrier and casing pipes located beneath roads, highways, railroads and other structures and installed by jacking and augering or by jacking and mining.
- B. Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 31 23 16 - Excavation
 - 2. Section 31 23 23 - Backfilling
 - 3. Section 31 41 00 - Shoring, Sheeting and Bracing
 - 4. Section 33 05 55 - Buried Ductile Iron Pipe and Fittings
 - 5. Section 33 05 58 - Cathodic Protection
- C. Comply with the "Use of American Iron and Steel (UAIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specification Section 00 45 49.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ANSI/AWS D1.1 - Structural Welding Code – Steel
 - 2. ASTM A139 - Standard Specification for Electric-Fusion (Arc) - Welded Steel Pipe (NPS 4 and Over)
 - 3. ASTM A380 - Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
 - 4. ASTM C495 - Standard Test Method for Compressive Strength of Lightweight Insulating Concrete
 - 5. OSHA PL-91-596 - Occupational Safety Health Act of 1970 Public Law 91-596

1.3 SYSTEM DESCRIPTION

- A. Provide pipe installed via jacking, augering and mining to the line and grade and within the right-of-way or easements as shown or specified.
 - 1. Take responsibility for the design and adequacy of the jacking, augering and mining installation details and methods not shown or specified.
 - 2. Rock, including cobbles, boulders, bedrock, and other similar materials have the potential of being encountered along the pipeline alignment. Assure the practicality and feasibility of the jacking, augering and mining installation method based on the available soil and subsurface data. Take responsibility for obtaining additional soil and subsurface data through borings, test pits, or other means along the pipe alignment necessary to design and construct the proposed installation. The presence of rock, including cobbles, boulders, bedrock, and other adverse subsurface conditions will not warrant an increase in the Total Computed Price.

1.4 SUBMITTALS

- A. Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings, Product Data, and Information:
 - 1. Working drawings of the general arrangement, procedures, and equipment for completing the jacking installation, including the jacking and receiving pits, jacking pipe, jacking frame, jacking head, reaction blocks, casing and carrier pipes, backfill operations, and other required appurtenances, and material lists, including diameter, thickness, and class of the steel casing, end seals, and other materials for each complete jacking installation.
 - 2. Information: Grout mix design.
- C. Quality Control:
 - 1. A certificate signed and sealed by a Licensed Professional Engineer and registered in the State of Wisconsin that certifies that the Licensed Professional Engineer has evaluated and approved the CONTRACTOR's complete jacking installation and has prepared complete design calculations and working drawings for the jacking installation not specifically shown on the Drawings. Provide a separate certificate for each jacking installation.
 - 2. Approved permits associated with the jacking operations. It is the responsibility of the CONTRACTOR to submit the necessary permit documents and data to the appropriate authority and receive approval associated with the jacking operations.

3. Letters of notification to other utilities within the limits of construction.
4. Welders qualifications per ANSI/AWS D1.1.
5. Grout test results.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products and materials as specified in Division 1 and as follows.
- B. Transportation and Delivery: Take every precaution to prevent damage to the casing pipe during transportation and delivery to the site.
- C. Loading and Unloading:
 1. Take care in loading and unloading the casing pipe.
 2. Work slowly with skids or suitable power equipment, and keep casing pipe under control.
 3. Under no condition is the casing pipe to be dropped, bumped, dragged, pushed, or moved in any way that will cause damage to the pipe.
- D. Sling: When handling the casing pipe with a crane or other lifting equipment, use a suitable sling around the casing pipe to prevent damage to the pipe.
 1. Under no condition pass the sling through the casing pipe.
 2. Use a nylon canvas type sling or other material designed to prevent damage to the casing pipe.
 3. Steel cables, chain or like slings will not be acceptable.
- E. Damaged Casing Piping: If, in the process of transportation, handling, or laying, any casing pipe is damaged, replace or repair such pipe.
- F. Blocking and Stakes: Provide suitable blocking and stakes installed to prevent casing pipe from rolling.
- G. Storage:
 1. Stulling:
 - a. Provide stulling in accordance with the manufacturer's recommendations to maintain roundness of 1 percent measured in ovality by outer diameter (OD) and determined as follows and to

avoid damage to the casing pipe during handling, storage, and hauling.

$$\text{Ovality}\% = \frac{(\text{Maximum OD} - \text{Minimum OD})}{\text{Nominal OD}} \times 100$$

- b. Leave stulls in place until after the casing pipe has been installed. After the casing pipe is installed, remove stulls. Removed stulls will remain the property of the CONTRACTOR.
2. Protect casing pipe that will be stored during periods of adverse environmental conditions from the effects of drying.
3. Arrange casing pipe that is placed in storage so as not to cause inconvenience to traffic.

1.6 QUALITY CONTROL

- A. Complete boring and jacking operations by qualified personnel with sufficient experience involving Work of a similar nature.
- B. Provide a minimum of 3 days advance notice of the start of excavation and boring operations to RESIDENT PROJECT REPRESENTATIVE.
- C. Welding Requirements: Complete welding by skilled welders, welding operators, and tackers who have adequate experience in the type of materials to be used. Use only welders qualified under the provisions of ANSI/AWS D1.1 by an independent local agency prior to commencing Work on the casing or carrier pipe. In qualification tests, use machines and electrodes similar to those used in the Work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted.
 1. Casing Spacers:
 - a. Advance Products and Systems, Inc.
 - b. Cascade Waterworks Manufacturing Co.
 - c. The BWM Company
 2. Casing End Seals:
 - a. Advance Products and Systems, Inc.
 - b. Cascade Waterworks Manufacturing Co.

- c. GPT, Inc.
- d. The BWM Company

2.2 MATERIALS

- A. Casing Pipe: Use welded steel pipe with length, diameter, and wall thickness as shown, meeting the requirements of ASTM A139, Grade B. A greater diameter or thickness than that shown may be used at no additional cost to the OWNER if suitable for the method of Work and loadings involved, site conditions, and possible interferences. Provide full penetration butt welded pipe joints.
- B. Fill Material: Use fill material consisting of 1-1/4 pounds of Bentonite per gallon of water during jacking to fill any voids between casing pipe and the earth.
- C. Casing Spacers:
 - 1. Provide casing spacers as recommended by the manufacturer.
 - 2. Band Sections: Provide casing spacers comprised of a two-piece shell of 14-gauge (minimum) Type 304 stainless steel. Provide shells lined with 0.090-inch thick, ribbed PVC extrusion with an 85-90 durometer hardness and a retaining section that overlaps the edges of the shell and prevents slippage.
 - 3. Risers: Provide risers of maximum 10 gauge Type 304 stainless steel with bolt heads welded to the inside of the risers for strength. Reinforce risers 6-inches and over in height. Provide reinforced plates that are 10 gauge Type 304 stainless steel. Provide risers that are metal inert gas (MIG) welded to the mating parts where applicable. All weldments are to be fully chemically passivated in accordance with ASTM A380.
 - 4. Runners: Provide runners of ultra-high molecular weight, abrasion resistant polyethylene with a low 0.12 coefficient of friction. Attach runners to the support risers at appropriate positions to properly support the carrier pipes with the casing pipe. Provide the number of runners as recommended by the manufacturer.
- D. Casing End Seals:
 - 1. Style: Provide casing end seals of the wrap-around style.
 - 2. Annulus Wrapping: Provide annulus wrapping of 1/8-inch thick neoprene rubber.
 - 3. Hold-Down Banding: Provide 1/2-inch wide Type 304 stainless steel worm gear banding.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Install casing pipe, carrier pipe, casing spacers, fill materials, and appurtenances in accordance with the manufacturer's recommendations and approved shop drawings, as specified, and as shown.
 - 1. Design and carefully construct shafts so as to safeguard existing substructures and surface improvements, to preclude the loss or movement of ground that may damage nearby utilities and structures, and to comply with the requirements of the U.S. Department of Labor Safety and Health Regulations for Construction promulgated under OSHA PL-91-596 and Federal, State and local laws and regulations applying to the Work.
 - 2. Install casing pipe to proper lines and grades to allow for installation of the carrier pipe to the lines and grades shown.
 - 3. Complete boring and jacking operations simultaneously with continuous installation until the casing pipe is in final position. Carefully maintain correct line and grade. Provide full-ring add-on sections of casing pipe welded to the preceding length, developing water-tight total pipe strength joints. Provide the casing so as to produce no upheaval, settlement, cracking, movement or distortion of the existing roadbed or other facilities.
 - 4. Restrain carrier pipe joints within the casing pipe and outside of the casing pipe as shown.
 - 5. Repair and restore any damage or settlement to utilities or structures resulting from the boring and jacking operations.
- B. Permit Requirements: Conform operations and materials to the regulations of the highway department, railroad, or other agency having jurisdiction over the crossing. Obtain the approval, including permits, of materials and methods from the agency having jurisdiction over the crossing prior to submitting the required submittals. Adhere to the requirements of the permits.
- C. Augering: Conduct augering with the proper equipment and procedure such that the carrier pipe and the casing pipe are installed to the grades specified without disturbing the adjacent earth.
- D. Hand Mining: Conduct hand mining only in casings that are sufficiently large enough to permit such operation. Provide adequate fresh air supply within the casing pipe and conduct operations in accordance with the requirements of the U.S. Department of Labor Safety and Health Regulations for Construction promulgated under OSHA PL-91-596.

- E. Jacking Pit: Construct the jacking pit in accordance with OSHA requirements. Provide the jacking pit of adequate length to provide room for the jacking frame, the jacking head, the reaction blocks, the jacks, auger rig, and the jacking pipe. Make the pit sufficiently wide to allow ample working space on each side of the jacking frame and sufficiently deep so that the invert of the pipe, when placed on the guide frame, is at the elevation desired for the completed line. Provide excavation in conformance with Section 31 23 16.
1. Sheeting: Sheet the jacking pit tightly and keep it dry. Conform sheeting to Section 31 41 00.
 2. Jacking Frame: Use a jacking frame that applies a uniform pressure over the entire pipe wall area of the pipe to be jacked.
 3. Reaction Blocks: Use reaction blocks that carry the thrust of the jacks to the soil without excessive soil deflection and in such a manner as to avoid any disturbance of adjacent structures or utilities.
 4. Operation: Use hydraulic jacks in the jacking operation. Use care to hold the carrier pipe to specified line and grade. Advance the excavation at the heading manually or with an auger. Do not allow the advance to exceed more than one foot ahead of the casing pipe. Make every effort to avoid loss of earth outside the casing.
 5. Safety Railing: Provide a safety railing with a toeboard around the top of the pit.
 6. Cover approach trenches, jacking pits, and other open excavations in public streets at night and other non-working hours. Comply excavations in public streets with the applicable maintenance of traffic and permit requirements.
- F. Control of Alignment and Grade: Control the application of jacking pressure and excavation of materials ahead of the casing as it advances to prevent the casing from becoming earthbound or deviating from the required line and grade. Restrict the excavation of the materials to the least clearance necessary to prevent binding in order to avoid loss of ground and consequent settlement or possible damage to overlying structures. Grade deviations in horizontal and vertical alignments greater than 0.2 feet per 100 feet in any direction over the length of the jacking or boring or greater than a maximum deviation of 0.5 feet at any point are not permitted.
- G. Casing Spacers: Install casing spacers in accordance with the manufacturer's recommendations and approved shop drawings. Use of rails is not permitted.
1. Secure polymer casing spacers to the carrier pipe at 6-foot intervals inside the casing pipe. Arrange the spacers to provide 360-degree support for and to prevent floatation or shifting of the carrier pipe. Provide one casing spacer within 1 to 2 feet either side of a restrained push-on joint.

H. Carrier Pipe:

1. Install carrier pipe in accordance with the recommendations of the pipe spacer manufacturer and as shown.
2. After jacking equipment and excavated materials from the boring or jacking operations have been removed from the jacking pit, prepare the bottom of the jacking pit as a pipe foundation. Remove loose and disturbed materials below pipe grade down to undisturbed earth and re-compact the material in accordance with Section 31 23 23.
3. Bulkhead the ends of the casings, backfill the approach trenches, place temporary resurfacing, and reopen the affected portion of the street to traffic if the carrier pipe in the casing pipe at the time of completion of the boring and jacking operations is not ready to be placed.

I. Electrical Isolation: After casing spacers are installed but prior to grouting of the casing annulus, perform electrical isolation test to verify that casing and carrier pipes are electrically separated as follows:

1. Measure and record the DC voltage difference between the casing and the carrier pipes using a digital voltmeter having at least 10 mega-ohm input impedance.
2. If the DC voltage difference is not greater than zero DC millivolts, remove electrical connection between the casing and carrier pipes to provide electrical separation and repeat the electrical isolation test. Do not grout the casing annulus until a DC voltage difference of greater than zero DC millivolts is measured and recorded.

J. Grout Annular Space:

1. After carrier pipe is placed, fill the annular space between the carrier pipe the casing pipe with cellular grout having a minimum compressive strength of 500 psi.
2. Perform grouting operations in accordance with the pipe manufacturer's recommendations.
3. Testing:
 - a. Perform field control tests, including unit weight (wet density), flow consistency, and compressive strength.
 - b. Mold a minimum of four 3 inch x 6 inch cylinders for each shift of operation.

- c. Grout may be tested at any age after three days of compressive strength. At least two specimens from each set should be tested at 28 days in accordance with ASTM C495.
 - d. Measure flow consistency and unit weight (wet density) at the point of placement from first batch mixed, every hour during the pour, and from each batch of grout from which compressive strength test cylinders are made.
- K. Casing End Seals: After the jacking is complete and the carrier pipe has been installed, seal the ends of the casing pipe as shown.
- L. Backfill: Upon the completion of the jacking, augering and mining Work, provide backfill as shown and as specified in Section 31 23 23.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 33 05 50

LAYING AND JOINTING BURIED PIPELINES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Installation of buried pipelines and appurtenance piping. Provide pipeline materials, coatings and linings as specified and pipe of the types, sizes and classes shown or specified.
2. Furnishing of supports and hangers and installation of interior and exposed exterior piping and supports in vaults. Furnish, support, hang and install piping of the materials shown or specified at locations as specified or where shown.

B. Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:

1. Section 01 45 50 - Leakage Tests
2. Section 31 23 16 - Excavation
3. Section 31 23 19 - Dewatering
4. Section 31 23 23 - Backfilling
5. Section 33 05 53 - Buried High Density Polyethylene Pipe and Fittings
6. Section 33 05 55 - Buried Ductile Iron Pipe and Fittings
7. Section 33 05 70 - Locating Buried Pipelines
8. Section 40 05 01 - Supports and Anchors

1.2 REFERENCES

A. Codes and standards referred to in this Section are:

1. ASME B1.20.1 - Pipe Threads, General Purpose, Inch
2. ASME B31.1 - Power Piping with Addenda
3. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping
4. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe With Ductile-Iron or Grey-Iron Threaded Flanges

5. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances
6. AWWA Manual M11 - Steel Pipe: A Guide for Design and Installation
7. Plastic Pipe Institute (PPI) - Handbook of Polyethylene Pipe, Pipeline Joining Procedures
8. United States Code of Federal Regulations, Title 49: Transportation, Part 192 – Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards, Subpart F – Joining of Materials Other Than by Welding (49 CFR 192 Subpart F)

1.3 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle products and materials as specified in Division 1 and as follows.
- B. Transportation and Delivery: Take every precaution to prevent damage or wear to the pipe during transportation and delivery to the site.
 1. Cover pipe bell and spigot ends to keep the inside of the pipe clean of exhaust fumes, films, and other residue during transportation and delivery in accordance with the manufacturer's recommendations.
- C. Loading and Unloading: Take care in loading and unloading the pipe and fittings to prevent injury to the pipe and fittings.
 1. Work slowly with skids or suitable power equipment, and keep pipe under perfect control.
 2. Under no condition is the pipe to be dropped, bumped, dragged, pushed, or moved in any way that will cause damage to the pipe or coating.
 3. Protect the pipe from drying effects and possible contamination.
- D. Sling: Handle the pipe and fittings using belt slings, padded cradles, or other devices, designed and constructed to prevent damage to the pipe, coating or lining. When handling the pipe with a crane or other lifting equipment, use a suitable sling around the pipe.
 1. Under no condition pass the sling through the pipe.
 2. Use a nylon canvas type sling or other material designed to prevent damage to the pipe and coating.

3. The use of steel cables, chains, hooks, or other like equipment that might injure the pipe, coating or lining will not be permitted, unless specifically required by authorities having jurisdiction and approved by the RESIDENT PROJECT REPRESENTATIVE.
- E. Damaged Piping: If in the process of transportation, handling, or laying, any pipe or fitting is damaged, replace or repair such pipe or pipes.
- F. Blocking and Stakes: Provide suitable blocking and stakes installed to prevent pipe from rolling.
 1. Obtain approval for the type of blocking and stakes, and the method of installation.
- G. Storage:
 1. Storage for Pipe: Store stockpiled pipe on pallets, skids, sand or rock free berms, sand bags, old tires or other suitable means so that the pipe and coating is not damaged and as recommended by the manufacturer.
 - a. Do not roll, push, or slide the pipe into place.
 - b. Protect pipe that will be stored during periods of adverse environmental conditions from the effects of drying.
 - c. Arrange pipe that is placed in storage so as not to cause inconvenience to traffic.
 - d. Do not stack pipes higher than the limits recommended by the manufacturer. Keep the bottom tier off the ground on timbers, rails, or concrete. Confirm stacking to the manufacturer's recommendations.
 2. Storage for Gaskets: Store gaskets for pipe joints in a cool place and protect gaskets from light, sunlight, heat, oil, or grease until installed.
 - a. Do not use any gaskets showing signs of checking, weathering or other deterioration.
 - b. Do not use gasket material stored in excess of six months without approval.

1.4 FIELD CONDITIONS

- A. Encase or rebed utilities that cross over or under new pipe in flowable fill or pipe bedding as shown. Reconstruct utilities damaged by pipeline construction in accordance with the requirements of the authority having jurisdiction.

1. Furnish and install materials and do Work necessary for the reconstruction or repair of sanitary sewers and services and other utilities.
2. Provide pipe for reconstruction of sanitary sewers and services and other utilities matching the existing pipe. If the requirements of the authority having jurisdiction are more stringent than the existing pipe, provide pipe meeting the requirements of the authority having jurisdiction and obtain approval for the new pipe.
3. Provide pipe of the same size as the existing sewer or when the same size is not available, use the next larger size of pipe. Obtain approval of joints made between new pipe and existing pipe.
4. Where possible utilities are indicated or expected to exist in the pipe trench, hand-excavate to locate and expose utility.
5. Reconstruct utilities on private property or easements, including drain tiles, damaged by pipeline construction in kind, unless required otherwise by the authority having jurisdiction, and in coordination with the property owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide pipe, fittings, and appurtenant materials as shown and specified.
- B. Provide hangers and supports and necessary appurtenances as specified in Section 40 05 01.

2.2 FABRICATION

- A. Coating: Provide threads coated with a suitable pipe dope, Masters Metallic Compound, graphite and engine oil, or equal, before jointing.

PART 3 EXECUTION

3.1 PREPARATION

- A. Dry Trench Bottoms: Lay pipe only in dry trenches having a stable bottom.
 1. Where groundwater is encountered, make every effort to obtain a dry trench bottom.
 2. If a dry trench bottom has not been obtained due to improper or insufficient use of known methods of trench dewatering, then the order to excavate

below grade and place sufficient bedding material, crushed stone, or Class D concrete over the trench bottom may be given.

3. If efforts fail to obtain a stable dry trench bottom and it is determined that the trench bottom is unsuitable for pipe foundation, obtain an order, in writing, for the kind of stabilization to be constructed.
4. Prevent water from entering the trench to the extent required to properly grade and allow for proper compaction of pipe bedding and backfill. Provide dewatering of surface water that enters the excavation for proper completion of the Work.
5. Perform trench excavation and backfill in accordance with Sections 31 23 16 and 31 23 23.

3.2 INSTALLATION

A. General: Install piping in accordance with the manufacturer's recommendations, approved shop drawings and as specified. Refer to the specification specific to the pipe material being installed.

1. Arrange miscellaneous pipelines shown in diagram form on the Drawings clear of other pipelines and equipment.
2. Use suitable fittings where shown and at connections or where grade or alignment changes require offsets greater than those recommended and approved.
3. Use proper and suitable tools and appliances for the safe cutting, handling, and laying of the pipe and fittings.
4. Provide factory prepared pipe ends unless a field cut is required for connections.
5. Cutting Pipe and Dressing Cut Ends:
 - a. Cut pipe with a portable abrasive cut-off saw, a rotary wheel cutter, a guillotine pipe saw, a chain saw made to cut the pipe material, or a milling saw. The use of flame cutting or hydraulic squeeze type cutters is not acceptable. Field-cut holes for saddles with mechanical cutters. The use of equipment for cutting pipe contrary to the pipe manufacturer's recommendations is not acceptable.
 - b. Cut pipe smooth, straight, and at right angles to the pipe axis in a neat manner, without damage to the pipe lining.

- c. After cutting, dress the ends of the pipe with a file or a power grinder to remove roughness and sharp edges. Dress the ends of pipe in accordance with the type of joint to be made and as recommended by the manufacturer. Bevel cut ends of push-on joint pipe as recommended by the manufacturer.
- B. Code Requirements: Provide pipeline installations complying with AWWA C600 for ductile iron pipe, AWWA Manual M11 for steel pipe, and as modified or supplemented by the Specifications.
- C. Pipe Laying - General:
 - 1. Thoroughly clean the interior of pipe and fittings of foreign matter prior to installation. Cut away any lumps or projections on the face of the spigot end or the shoulder.
 - 2. For pipelines intended for gravity flow, begin pipeline laying at the low end of a run and proceed upgrade.
 - 3. Generally, lay pipe with bells pointing ahead.
 - 4. Do not lay pipe until the trench has been excavated as specified, shown, or as directed to provide a firm bed for supporting the pipe. Do not lay pipe upon a material in which frost exists nor at any time when the RESIDENT PROJECT REPRESENTATIVE deems that there is a possibility of the formation of ice or the penetration of frost at the bottom of the excavation.
 - 5. Carefully lay pipelines accurately to line and grade. Do not drop or dump pipe or accessories into trench. Lay pipelines in trench excavations on pipe bedding material or other foundations as shown, specified or ordered in writing. Rest no part of the pipe upon or against rock.
 - 6. Lay pipelines not supported on piles, concrete cradle, or other structural support in pipe bedding material. Carefully grade and compact pipe bedding. Install the barrel of the pipe so that it is in contact on the sides and the bottom of the pipe with the shaped, compacted pipe bedding so as to provide full bearing on and uniform support by the pipe bedding throughout the entire length of pipe. Make adjustments by scraping away or filling in pipe bedding material under the body of the pipe. Hand tamping under the end of the pipe to bring it to grade or wedging or blocking up the pipe barrel is not permitted.
 - 7. Properly secure the pipe against movement and make the pipe joints in the excavation as required. Bring the faces of the spigot ends and the bells of pipes into contact and firmly and completely shove the pipe home. Do not bring succeeding pipe into position until the preceding length is covered with backfill and secured in place.

8. Bell Holes:
 - a. Cut out bell holes for each joint as required to permit the joint to be properly made and allow the barrel of the pipe to have full bearing throughout its length.
 - b. Thoroughly tamp bell holes full of pipe bedding material following the making of each joint.
9. Take care to secure water tightness and to prevent damage to or disturbing of the joints during backfilling and after the pipes have been laid and the joints have been made.
10. Take every precaution to prevent the floating of the pipe due to water accumulation in the trench, or the collapse of the pipeline. Should floating or collapse occur, inspect for damage. Replace damaged pipe at no expense to the OWNER.
11. Keep the interior of pipelines clean and free of dirt and other deleterious material during construction. Maintain a clean pipe interior clear of sand, dirt, mortar splatter, and other deleterious material prior to testing the completed pipeline.

D. Interior and Exposed Exterior Piping:

1. Install exposed piping at right angles or parallel to structure, vault, or manhole walls. Diagonal runs are not permitted, unless expressly indicated.
2. Install piping free of sags or bends.
3. Place pipe runs to minimize obstruction to other Work.
4. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
5. Slope piping as shown and arrange systems to drain at low points.
6. Do not penetrate structural members unless shown.
7. Locate groups of piping parallel to each other and at common elevations whenever practical, spaced to permit servicing of valves.
8. Fit and install pipelines in a neat and workmanlike manner in accordance with approved shop drawings.

9. Provide an adequate number of unions in main pipe and branch pipe runs to facilitate dismantling or removal of pipeline sections without disturbing adjacent branch or connecting lines.
 10. Install suitable sleeves at points where pipes pass through walls or floors of structures and where wall castings are not provided.
 11. Include proper pipe protection saddles on pipes.
- E. Other Foundations: Install pipelines laid on other types of foundations as specified for such other foundations or as ordered in writing.
- F. Ductile Iron Pipe Mechanical Joints:
1. Assembly:
 - a. In making up mechanical joints, center the spigot in the bell.
 - b. Thoroughly brush the surfaces with which the rubber gasket comes in contact with a wire brush just prior to assembly of the joint.
 - c. Brush lubricant over the gasket just prior to installation.
 - d. Place the gasket and gland in position, bolts inserted, and the nuts tightened fingertight.
 - e. Tighten the nuts with a torque wrench so that the gland is brought up toward the pipe evenly.
 2. Torques: Apply bolt torques complying with AWWA C600.
 3. Remaking of Joints: If effective sealing is not obtained at the maximum torque listed above, disassemble and reassemble the joint after thorough cleaning.
- G. Ductile Iron Pipe Rubber Gasket Joints:
1. When installing in colder temperatures, keep rubber gasket at or above 40 degrees Fahrenheit by suitable means prior to installation.
 2. Assembly:
 - a. In making up the rubber gasket joint, brush the gasket seat in the socket thoroughly with a wire brush and wipe the gasket with a cloth.
 - b. Place the gasket in the socket with the large round end entering first so that the groove fits over the bead in the seat.

- c. Apply a thin film of lubricant to gasket that will come in contact with the entering pipe. Utilize the furnished pipe manufacturer's gasket lubricant. Substitute lubricants are not permitted.
 - d. Thoroughly brush the plain end of the pipe to be entered with a wire brush and place it in alignment with the bell of the pipe to which it is to be joined. Apply a thin film of lubricant to the plain end of the pipe from the end of the spigot to the first home line of the spigot.
 - e. Take care to keep the bell, spigot and the gaskets free of dirt and other deleterious materials during the jointing process.
 - f. Exert sufficient force on the entering pipe so that its plain end is moved past the gasket until it makes contact with the base of the socket to make the joint. Ensure both pipes are properly aligned with each other during connection.
 - g. Fully extend push-on restrained joint piping to remove the slack in the locking segment cavity.
3. Positioning: Before proceeding with backfilling, feel completely around the joint using a feeler gauge to confirm that the gasket is in its proper position. Confirm the gasket is uniformly distributed around the pipe circumference.
- a. If the gasket can be felt out of position, replace it with a new one.
 - b. If the gasket has been damaged, replace it with a new one before re-installing the pipe.
4. Optional Mechanical Joints: Use mechanical joint fittings that meet the requirements of Section 33 05 55 with the rubber gasket joint pipe when specified or when rubber gasket fittings are not available. Non-restrained mechanical joints are not acceptable.
- H. Threaded Joints: Conform threaded joints to ASME B1.20.1, tapered pipe threads for field cut threads unless otherwise specified. Join pipe, fittings, and valves as follows:
- 1. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - 2. Align threads at point of assembly.
 - 3. Apply appropriate tape or thread compound to the external pipe threads.

4. Assemble joint to appropriate thread depth. Assemble joint to produce a tight joint without evidence of heat in the threaded portion. When using a pipe wrench on valves, place wrench on valve end into which pipe is being threaded.
5. Damaged Threads: Do not use pipe with threads which are corroded, or damaged. If weld opens during cutting or threading operations, do not use that portion of pipe.
6. Retightening: Once a threaded joint has been assembled, it is not to be backed off unless the threads are recleaned and new compound or tape applied before rejoining.

I. Flanged Joints:

1. Fabricate flanged pipe in the shop, not in the field, and deliver to the jobsite with flanges in place and properly faced. Individually fit and machine tighten threaded flanges on matching threaded pipe by the manufacturer.
2. Face flanges after fabrication in accordance with AWWA C115/A21.15.
3. Assembly:
 - a. Clean oil, grease, and other foreign material from the faces of the flanges before connecting flanged pipe.
 - b. Take care to keep the gaskets free of dirt and other deleterious materials before, during, and after the jointing process.
 - c. Take care to provide proper fit and seating of the flange gasket.
 - d. Tighten bolts so that the pressure on the gasket is uniform.
 - e. Use torque-limiting wrenches to provide uniform bearing.
 - f. Remove and reset gasket and retighten bolts at joints that leak during retightening.

J. Welding: Comply welding of pipe joints with the requirements of ASME B31.1 unless otherwise specified. Do off site welding of stainless steel pipe conforming to the appropriate requirements.

1. Procedures: Confirm that pipe and fittings with wall thickness of 3/16 inch and larger have ends beveled for welding, and that the parts to be welded are securely held in place and are in proper alignment during welding.
 - a. Separate the abutting pipe ends before welding to permit complete fusion to the inside wall of the pipe without overlapping.

- b. Provide welding continuous around the joint and completed without interruption.
- c. Provide welds of the single vee butt type, of sound weld metal thoroughly fused into the ends of the pipe and into the bottom of the vee.
- d. Provide welds free from cold shuts, pinholes, oxide inclusions or other defects.

K. Joining High Density Polyethylene (HDPE) Pipe and Fittings:

- 1. Join pipe and fittings by butt fusion welding unless authorized otherwise in writing. Perform butt fusion welding of HDPE pipe and fittings by certified fusion welders in the presence of the RESIDENT PROJECT REPRESENTATIVE and in accordance with Section 33 05 53, the manufacturer's recommendations, the PPI Handbook of Polyethylene Pipe, Polyethylene Joining Procedures, and 49 CFR 192, Subpart F.
- 2. Inspect each length of pipe and clean and dry as necessary to remove debris and other deleterious material immediately prior to joining. Clean and dry HDPE pipe and fittings prior to joining.
- 3. Join HDPE pipe and fittings such that the interior surface is smooth and watertight and the wall thickness at the point of fusion is the same as the adjoining pipe. Remove internal bead projections greater than 3/16-inch.
- 4. Use fusion equipment appropriately sized and outfitted as recommended by the pipe manufacturer and as follows:
 - a. Heat Plate: Use heat plates capable of maintaining a uniform, consistent heat profile and temperature for the pipe or fitting being fused in good condition with no deep gouges or scratches, clean of debris or contamination. Assure temperature uniformity a minimum of two times every eight hours.
 - b. Data Logger: Use a fusion machine connected to a data logger equipped with the current version of the pipe manufacturer's recommended and compatible software.
 - c. Canopy: Use a weather protection canopy that follows the motion of the heat plate and fusion assembly in inclement or windy weather.
 - d. Facing Blades: Use facing blades appropriate for cutting HDPE pipe.
- 5. Pipe Rollers: Use pipe rollers as specified in Section 33 05 22.

6. Provide each butt-welded joint with an identification number marked on the pipe joint.
 7. Log and record fusion data for each joint with a data logger capable of recording the parameters in accordance with Section 33 05 53 and as recommended by the pipe manufacturer. Use a data logger capable of field printed reports and of providing the field operator a graphical representation of the previously completed joint. Manually record data not logged by data logger. Cross reference fusion data to identification marks on each joint.
 8. Provide a tensile strength at yield for butt-fusion joints not less than that of the pipe.
 9. Fused joints will be subject to inspection prior to installation by the RESIDENT PROJECT REPRESENTATIVE.
- L. Temporary Bulkheads: Close off lines with bulkheads, tight-fitting “night cap”, or equal temporary stopper when pipe laying is not in progress to keep out sand, earth, and other deleterious material from entering the pipe. Provide perforations near the center of the stopper to admit water into the pipe to prevent flotation in the event the trench is flooded. Provide temporary bulkheads at the ends of sections where adjoining pipelines have not been completed, and in connections built into pipelines where adjoining pipelines or structures have not been completed and are not ready to be connected.
1. Remove bulkheads encountered in connecting pipes or structures included in this Contract, or in pipes or structures previously built, when they are no longer needed or when ordered. Remove any standing water from the trench before the stopper is removed.
- M. Sleeve Type Couplings: For sleeve type couplings, equally tighten diametrically opposite bolts on the connection so that the gaskets will be brought up evenly around the pipe.
1. Torque Wrenches: Do the final tightening with torque wrenches set for the torque recommended by the coupling manufacturer.
- N. Concrete Cradle
1. General: When a concrete cradle is shown, specified, or ordered in writing, lay the pipe to grade by supporting each section on concrete blocks located near each end.
 - a. Shape the tops of the blocks to fit the outside diameter of the pipe.
 - b. Set the blocks approximately 3/8 inch low.

- c. Place the pipe on the blocks on a layer of stiff mortar of sufficient thickness to bring the pipes to exact grade.
 - d. Timber blocking is not acceptable.
 - 2. Cradle: Place Class D concrete cradle, on one side only, until it has risen above the invert on the other side, after which deposit the remainder of the concrete on both sides to the pipe spring line.
 - a. Prevent movement of the pipe during concrete placement.
- O. Concrete Encasement: When concrete encasement is to be provided as shown, specified, or ordered in writing, lay and block the pipeline and place concrete as specified for concrete cradle.
 - 1. Continue the placing of concrete to provide complete encasement to the dimensions shown, specified, or ordered.
- P. Valve Box Setting: Install valve boxes vertical and concentric with the valve stem.
 - 1. Satisfactorily reset any valve box which is moved from its original position, preventing the operation of the extension valve stem.
 - 2. Replace any extension valve stem which has been damaged.
- Q. Erection:
 - 1. Thrust Restraint: Provide thrust restraint of pipelines and appurtenances as shown or as ordered.
 - a. Provide restrained joints as specified in Section 33 05 55 for thrust restraint. Install pipe with restrained joints for the distance (both upstream and downstream of pipeline appurtenances) as shown.
 - b. Thrust blocks are not allowed for use on this project, except as ordered in writing.
 - 2. Valve Setting: Erect valves carefully in their proper positions, free from distortion and strain, with flanged, mechanical or push-on joints restrained joints as shown, specified, or required, and pack and leave in satisfactory operating condition.
 - 3. Short Tunnel Construction:
 - a. Joint pipes to be placed in short tunnels prior to being placed into position.

- b. Place the pipe into position in a manner which keeps joints tight.
- R. Anchors and Stands: Furnish and install anchors and stands when specified, shown, or required for holding the pipelines and equipment in position or alignment.
 - 1. Small Piping Supports: Where adjustable supporting devices are not required, support pipelines 3 inches in diameter and smaller on stainless steel hooks, hook plates, rings or ring plates.
- S. Hangers and Supports
 - 1. Direction Changes: Provide pipe hangers at each change in pipe direction, on both sides of pipe mounted valves and equipment and on both sides of pipe loops and expansion absorbing devices.
 - 2. Brackets: Use brackets for the support of piping from vertical surfaces.
 - 3. Anchors: Furnish and install anchors when specified, shown, or required for holding the pipelines and equipment in position or alignment.
 - 4. Inserts: Install inserts in concrete structures where required for fastening supporting devices.
 - 5. Controlled Movements: Install hangers and supports to allow controlled movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
 - 6. Load Distribution: Adjust hangers to distribute loads equally on the attachment and to achieve any indicated slope of the pipe.

3.3 FIELD QUALITY CONTROL

- A. Testing: Test pipelines in accordance with Section 01 45 50.
 - 1. Test valves in place, as far as practicable, and correct any defects in valves or connections.
- B. Inspection: Clean, inspect, and examine each piece of pipe and each fitting and special for defects before it is installed.
 - 1. Do not use any cracked, broken, or defective pieces in the Work.

2. If any defective piece is discovered after having been installed, remove and replace this piece with a sound piece in a satisfactory manner at no increase in Contract Amount.

3.4 CLEANING

- A. General: Thoroughly clean interior of pipe before it is laid and keep it clean until final acceptance of the work.
- B. Thoroughly clean threads for threaded joints after reaming.
- C. Removal of Materials: Exercise special care to avoid leaving bits of wood, dirt, and other deleterious material in the pipe except water when pipe laying is stopped. If any material is discovered before the final acceptance of the Work, remove deleterious material.

3.5 FLUSHING

- A. Assume the expense for providing water to flush the pipelines.
- B. For mains smaller than 24-inches in diameter, flush installed pipe and fittings in accordance with AWWA C651, Section 4.4.2. Continue flushing until turbidity is consistently below 1 NTU, demonstrated with a calibrated on-line analyzer.
- C. For 24-inch or larger diameter mains and connecting fittings, broom-sweep connected mains and fittings as being installed carefully removing all sweepings during construction.

3.6 SCHEDULE

- A. Definitions: Abbreviations used in the schedule are:

1. Pipe Materials:

- | | | |
|----|------|---------------------------|
| a. | Al | Aluminum |
| b. | DI | Ductile Iron |
| c. | HDPE | High Density Polyethylene |
| d. | SS | Stainless Steel |
| e. | St | Steel |

2. Joints:

- | | | |
|----|-----|-----------------------------|
| a. | F | Flanged |
| b. | FW | Fusion Welded |
| c. | CM | Camlock |
| d. | PO | Push-on Joint, Unrestrained |
| e. | POR | Push-on Joint, Restrained |

- f. RMJ Restrained Mechanical Joint
- g. Sc Screwed
- h. W Welded

3. Coatings and Linings:

- a. BC Bituminous – Cold Applications
- b. CL Cement-Mortar Lined
- c. PEW Polyethylene Wrapped

4. Other:

- a. DIPS Ductile Iron Pipe Size
- b. DR Dimension Ratio
- c. Ext. Exterior
- d. HDD Horizontal Directional Drilling
- e. HGL Hydraulic Grade Line
- f. Int. Interior
- g. SCH Schedule

B. Pressure test pipe as specified in the Buried Piping Schedule as follows:

TEST PRESSURE SCHEDULE		
Reach of Return Flow Pipeline		Test Pressure HGL (feet)
From	To	
Pipeline Start at STA 0+00.00	Pipeline End at Contract Package 2B	1,180
Pipeline Start at STA 2000+00.00	Intersection of National Ave (CTH ES) and Racine Avenue (CYH Y)	1,180
Intersection of National Ave (CTH ES) and Racine Avenue (CYH Y)	Pipeline End at Contract Package 6	1,060

C. Schedule: Provide products as listed in the following schedule.

BURIED PIPING SCHEDULE								
Service	Size (Inches)	Pipe Material	<u>Protective Coatings</u>		Joints	Test Pressure HGL (feet) or Pressure (psig)	Pipe Class or Thickness (inches)	Notes
			Int.	Ext.				

RETURN FLOW PIPELINE

Pipeline

Trenched (Open Cut)	30	DI	CL	BC, PEW	F, PO, POR, RMJ	Note 2	150, 200	1, 2, 3
Carrier Pipe	30	DI	CL	BC, PEW	POR	Note 2	150, 200	1, 2, 3, 4
Casing Pipe	48	St	--	--	W	--	0.688 inches	4
HDD	36	HDPE	--	--	FW	Note 2	DIPS DR 11	1, 2
Current Isolation Piece	36	HDPE	--	--	FW	Note 2	DIPS DR 11	1, 2

Blow-Off Assemblies

Blow-Off Pipe	8	DI	CL	BC, PEW	POR, RMJ	Note 2	350	1, 2, 3
Blow-Off Extension	6	Al	--	--	CM	--	--	--

Air Valve Assemblies

Outlet Pipe	4, 6, 20	DI	CL	BC	F	Note 2	350	1, 2, 3
Vent Riser Pipe	6	SS	--	--	W	30 psig	SCH 80	1
Vent Pipe	2	SS	--	--	Sc	30 psig	SCH 10	1

Notes:

1. Refer to Section 01 45 50 for test pressure requirements.
2. Refer to the Test Pressure Schedule this Section.
3. Continuity bond joints as shown and specified.
4. Provide carrier pipe in casing pipe as shown and specified. Do not provide continuity bond between casing and carrier pipes.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 33 05 53

BURIED HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS

PART 1 GENERAL

1.1 SUMMARY

Section Includes: Requirements for providing buried High Density Polyethylene (HDPE) pipe, fittings and appurtenances.

A. Related Work Specified In Other Sections Includes, But is Not Limited to, the Following:

1. Section 01 45 50 - Leakage Test
2. Section 33 05 22 - Horizontal Directional Drilling
3. Section 33 05 50 - Laying and Jointing Buried Pipelines
4. Section 33 05 55 - Buried Ductile Iron Pipe and Fittings
5. Section 33 05 70 - Locating Buried Pipelines

1.2 REFERENCES

A. Codes and standards referred to in this Section are:

1. ASTM D638 - Standard Test Method for Tensile Properties of Plastics
2. ASTM D1238 - Standard Test method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
3. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique
4. ASTM D1603 - Standard Test Method for Carbon Black Content in Olefin Plastics
5. ASTM D2122 - Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
6. ASTM D2290 - Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe
7. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

8. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
9. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
10. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4-In. Through 66-In (100 mm Through 1,650 mm) for Waterworks
11. AWWA M55 - PE Pipe – Design and Installation
12. PPI TR-4 - Plastic Pipe Institute Listing of Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe

1.3 SYSTEM DESCRIPTION

- A. Design Standards: Provide HDPE pipe and fittings complete with necessary materials, specials, adapters, and other appurtenances meeting the requirements of AWWA C906 for the construction of the pipeline complete in place as shown and specified.
 1. Provide HDPE pipe and fittings of Ductile Iron Pipe Size (DIPS), Dimension Ratio 11 (DR 11) minimum as specified in the schedule or shown. If required, provide thicker wall as approved for the HDD installation in accordance with the requirements of Section 33 05 22.
 2. Manufacture and fabricate pipe at a single plant location by the approved pipe supplier. Fittings and specials may be fabricated at a site other than where the pipe is manufactured.

1.4 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings, Product Data, and Information:
 1. Pipe joints, fittings, adapters, and appurtenances. Where special designs or fittings are required, provide a drawing to show the Work in large detail and completely describe and dimension items.
 2. Maximum safe pull force and minimum bending radius for horizontal directional drilling.

3. Alignment survey signed and sealed by a land surveyor registered in the State of Wisconsin and a laying schedule. Cross reference the laying schedule to identification marks on the pipeline pieces.
4. Catalog data for pipe, fittings, adapters, and other appurtenances.
5. Installation method, fusion method, adapter system, quality control procedures, and specialized equipment.

C. Quality Control:

1. A certificate of compliance for pipe, fittings, appurtenances, and other products attesting that the items are in compliance with the Contract Documents, referenced standards, and “American Iron and Steel (AIS)” requirements.
2. An affidavit from the pipe supplier that plant and equipment capacity is sufficient to perform the required pipe production, testing, and fabrication within the specified Contract Time in accordance with the CONTRACTOR’s approved Progress Schedule.
3. Premanufacture notification for HDPE pipe, fittings, specials, adapters, and other appurtenances.
4. Current welder certifications for welders performing fusion welds. Expired certifications are not acceptable.
5. Fusion data for each field-welded joint, including pipe size and thickness, machine size, fusion welder identification, job identification, fusion joint number, fusion, heating, and drag pressure settings, graph of fusion cycle, heat plate temperature, time stamp, heating and cool down time of fusion, and ambient temperature. Cross reference fusion data to identification marks on each joint.
6. A certificate by the pipe manufacturer that CONTRACTOR has been trained in the proper method of handling, joining, and installing new HDPE pipe and fittings, including installation by horizontal directional drilling.

1.5 QUALITY ASSURANCE

- A. Work under this Section including the production and testing of the pipe, fittings, specials, adapters, and other appurtenances is subject to inspection by the OWNER or the ENGINEER in the pipe supplier’s or pipe manufacturer’s plant.

- B. Materials and butt fusion joints are subject to inspection and rejection for failure to meet requirements of this Section, including any of following. Replace or repair rejected pipe, fittings, or joints.
 - 1. Pipe, fittings, or joints with a gash, blister, abrasion, nick, scar, or other deleterious fault with a depth greater than 10 percent of the wall thickness.
 - 2. Pipe, fittings, or joints concentrated ridges, discoloration, excessive spot roughness, pitting, or insufficient or variable wall thickness.
 - 3. Damage from bending, crushing, stretching, or other stress.
 - 4. Damage that impacts pipe strength, internal diameter, or internal roughness characteristics.
 - 5. Pipe, fittings, or joints damaged in a manner described in the HDPE pipe manufacturer's guidelines.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products and materials as specified in Division 1 and Section 33 05 50.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Manufacturers of equivalent products may be submitted unless specified otherwise.
 - 1. HDPE Pipe and Fittings: Equivalent products may not be submitted.
 - a. Chevron Phillips Chemical Company LP, Performance Pipe
 - b. JM Eagle, Inc.
 - c. WL Plastics
 - 2. HDPE Mechanical Joint Adapters
 - a. Improved Piping Products, Inc.

2.2 MATERIALS

- A. Pipe and Fittings:
 - 1. Provide HDPE pipe and fittings meeting the requirements of AWWA C906 made from virgin resin meeting the requirements of PPI PE4710 with ASTM D3350 minimum cell classification of PE 445574C and having a

Hydrostatic Design Basis of 1,600 psi at 73 degrees Fahrenheit in accordance with ASTM D2837 and PPI TR-4. An approved higher cell classification may be provided at no additional cost to the OWNER as recommended by the manufacturer or necessary for the construction of the pipeline crossings installed via horizontal directional drilling.

2. Provide pipe and fittings homogenous throughout and free of visible cracks, holes, voids, foreign inclusions, or other defects with no recycled compounds except for rework material generated from the manufacturer's plant that has the same cell classification as the pipe or fitting to which it is being added.
3. HDPE elbows, bends, tees, reducers, and crosses are not acceptable for use on this project.

B. Color Identification:

1. Provide black HDPE pipe and fittings with minimum 2 percent carbon black for ultraviolet protection and at least three equally spaced longitudinal colored marking stripes so at least one stripe is visible from any angle. Color code longitudinal marking stripes for the intended use as follows.
 - a. Return Flow Pipeline: Green.
2. Provide striping made of the same material as the pipe except for color. Printed or painted stripes on the outside surface are not acceptable.

C. Molded Fittings: Provide and mark molded fittings in accordance with ASTM D3261. Provide molded fittings with a pressure rating meeting or exceeding that of the pipe.

D. Fabricated Fittings: Provide fabricated fittings made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings. Provide fabricated fittings with a pressure rating meeting or exceeding that of the pipe. Provide butt fusion outlets with the same outside diameter, wall thickness, and tolerances as the mating pipe.

E. HDPE Mechanical Joint Adapters: Buried HDPE pipe may be joined by means of mechanical joint adapters designed for joining HDPE pipe or for joining HDPE pipe to another material. Provide HDPE mechanical joint adapters in accordance with the manufacturer's recommendations made from the same resin as the pipe and having a pressure rating meeting or exceeding that of the pipe and with Type 316 stainless steel stiffener. Provide mechanical joint adapters with sufficient through-bore length to be clamped in a butt fusion joining machine without the use of a stub-end holder. Provide the sealing surface of the adapters machined with a series of small v-shaped grooves to provide gasketless sealing. Fit mechanical joint

adapters with ductile iron gland rings and provide bolts and nuts as specified in Section 33 05 55.

2.3 SOURCE QUALITY CONTROL

- A. Provide established quality control program through the pipe and fitting manufacturer for inspecting incoming and outgoing materials and assuring the quality of the pipe and fittings required by these specifications. Inspected incoming polyethylene materials for density, melt flow rate, and contamination. Certify the cell classification properties of the material and approve quality control before processing into finished goods. Check outgoing materials for the following:
 - 1. Outside diameter, wall thickness, and eccentricity as per ASTM D2122 at a frequency of at least once per hour or once per coil, whichever is less frequent.
 - 2. Visually inspect end cuts as per AWWA C906 on every length of pipe.
- B. Complete production and quality control checks for:
 - 1. Density as per ASTM D1505 at a frequency of at least once per extrusion lot.
 - 2. Melt Index as per ASTM D1238 at a frequency of at least once per extrusion lot.
 - 3. Carbon content as per ASTM D1603 at a frequency of at least once per day per extrusion line.
 - 4. Ring tensile strength size as per ASTM D2290 at a frequency of at least once per production run as per AWWA C906.
- C. Use x-ray inspection to inspect molded fittings for voids. Test knit line strength.
- D. Inspect fabricated fittings for joint quality and alignment.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install HDPE pipe and fittings in accordance with the manufacturer's recommendations and approved shop drawings, AWWA Manual M55, and as specified in Division 1, Section 33 05 22, and Section 33 05 50.
- B. Install HDPE pipe, fittings and appurtenances in soils free of petroleum products or organic solvents. If, during the course of excavation, impacted soil or groundwater is suspected or encountered, immediately take the steps necessary to

ensure worker health and safety, stop Work in the area with suspected or encountered impacted soil or groundwater, safely secure the site, and notify the RESIDENT PROJECT REPRESENTATIVE in writing. Proceed with the Work as authorized in writing and in accordance with Section 02 50 00.

- C. Service Connections and Tapping: No mechanical service saddles or taps are permitted on HDPE pipe or fittings unless authorized otherwise in writing.
- D. Tracer Wire: Provide tracer wire in accordance with Section 33 05 70.

3.2 FIELD QUALITY CONTROL

- A. Butt Fusion Testing: Use the first fusion of each day butt fusions are made as the trial fusion. Allow the trial fusion to cool completely, then cut out fusion test straps 12 inches minimum or 30 times the wall thickness in length with the fusion in the center, and 1 inch minimum or 1.5 times the wall thickness in width. Bend the test strap until the two ends of the strap touch. If the fusion fails at the joint, complete a new trial fusion and test. Do not provide butt fusion of pipe until a trial fusion has passed the bent strap test. Test a specimen of pipe cut across the butt-fusion joint in accordance with ASTM D638. A side bend test performed with a side bender or similar equipment is an acceptable alternative to a bend back test.
- B. Hydrostatic Pressure Testing: Flush, clean, and test HDPE pipe and fittings in accordance with Section 01 45 50 and Section 33 05 22.

3.3 SCHEDULES

- A. Refer to the schedule contained in Section 33 05 50 Laying and Jointing Buried Pipelines for information on the piping that is to be constructed using the pipe materials and methods specified herein.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 33 05 54

POLYETHYLENE ENCASEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Installation of polyethylene encasement around ductile iron pipe and fittings, valves, and appurtenances that require polyethylene encasement.
- B. Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 33 05 50 - Laying and Jointing Buried Pipelines
 - 2. Section 33 05 55 - Buried Ductile Iron Pipe and Fittings
 - 3. Section 33 05 58 - Cathodic Protection
 - 4. Section 40 05 20 - Valves

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems
 - 2. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances
 - 3. AWWA M41 - Ductile-Iron Pipe and Fittings, Third Edition
 - 4. DIPRA - Installation Guide for Ductile Iron Pipe

1.3 SYSTEM DESCRIPTION

- A. Design Standards: Provide polyethylene pipe wrap meeting the requirements of AWWA C105.
- B. Provide labor, materials, equipment and services required to furnish and install polyethylene encasement of ductile iron pipe and associated appurtenances such as fittings, valves, closure pieces, and appurtenances.

1.4 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.

B. Shop Drawings:

1. Polyethylene encasement descriptive literature and catalog cuts indicating materials, markings, and color.
2. Thermoplastic tape descriptive literature and catalog cuts.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle products and materials as specified in Division 1 and as follows.
- B. Transportation and Delivery: Take every precaution to prevent damage to the polyethylene during transportation and delivery to the site.
- C. Storage: Store polyethylene encasement and thermoplastic tape out of the sunlight.
- D. Handling: Never subject polyethylene-encased pipe to a point load during installation. Move the polyethylene encasement away from the timbers or hoisting device while on the pipe to prevent point loads and potential pin holes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below.
 1. Polyethylene Encasement:
 - a. Inner Layer: 8 mil of V-Bio[®] Enhanced Polyethylene Encasement. Equivalent products may not be submitted:
 - (1) Balcan Plastics Limited First Film Extruding
 - (2) Crayex Corporation
 - b. Outer Layer: 8 mil of generic polyethylene encasement

2.2 MATERIAL

- A. Polyethylene Encasement: Provide double-wrapped polyethylene encasement, one layer of V-Bio[®] Enhanced Polyethylene Encasement and one layer of generic polyethylene encasement, meeting the requirements of and in accordance with the recommendation and practices of AWWA C105, AWWA C600, AWWA M41, and the Ductile Iron Pipe Research Association (DIPRA) Installation Guide for Ductile Iron Pipe around ductile iron pipe and fittings, valves, and other pipeline appurtenances.

1. Provide V-Bio[®] Polyethylene Encasement sheet constructed of three layers of co-extruded linear low density polyethylene (LLDPE), fused into a single thickness of not less than 8 mils, where the inside surface of the polyethylene encasement to be in contact with the pipe exterior is infused with a blend of anti-microbial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.
 2. Provide generic polyethylene encasement sheet manufactured of 8 mil LLDPE film.
 3. Provide tube-form polyethylene encasement for pipe and pipe-shaped appurtenances.
 4. Provide flat sheet or split-tube polyethylene encasement for odd-shaped appurtenances.
 5. Provide polyethylene film envelope that is free of gels, streaks, pinholes, particles of foreign matter and undispersed raw materials as is commercially possible and with no other visible defects such as holes, tears, blisters or thinning out at folds.
 6. Provide polyethylene film that is distinctly marked at minimum 2 foot intervals with the following information:
 - a. Manufacturer's name or trademark
 - b. Year manufactured
 - c. Minimum film thickness and material type (i.e. LLDPE)
 - d. Range of nominal pipe diameter size
 - e. ANSI/AWWA C105/A21.5 compliance
 - f. Warning: "WARNING - CORROSION PROTECTION REPAIR ANY DAMAGE"
- B. Polyethylene Tape: Provide thermoplastic material with a pressure sensitive adhesive face capable of bonding to metal, bituminous coating, and polyethylene with a minimum thickness of 8 mils, and a minimum width of 1.5 inches.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Install polyethylene encasement in accordance with manufacturer's recommendations and approved shop drawings and as specified in Division 1.

- B. Encase ductile iron pipe, valves, and metallic appurtenances in polyethylene encasement to prevent contact with surrounding backfill and bedding material, unless shown or specified otherwise.
- C. Install polyethylene encasement on the pipe directly prior to the installation of the piece of pipe. Install the polyethylene material in accordance with the DIPRA Installation Guide for Ductile Iron Pipe and AWWA C105. Install tube-form polyethylene encasement per Modified Method A as described in AWWA C105. In wet conditions, or where the pipe will be at or below the water table, use Alternative Modified Method A - Wet Trench Conditions. Install polyethylene snugly and not tightly stretched.
- D. Repair holes smaller than the width of tape by placing tape directly over the hole. Extend the tape a minimum of 6 inches beyond the hole in each direction. Place a minimum of 2 additional strips of tape, the same length as the first strip, on each side of the first strip with a 1/2-inch overlap on each strip.
- E. Repair holes or tears larger than the tape width in any dimension by taping another piece of polyethylene over the hole with continuous tape around the entire perimeter of the patch piece. Extend the patch over the hole by a minimum of 6 inches in every dimension.
- F. Dig bell holes and slide polyethylene encasement over the adjacent pipe providing a minimum of 1 foot of overlap of the spigot side of the joint from the bell side.
- G. Where polyethylene-encased pipe being installed connects to a pipe that is not wrapped (including existing pipe), extend the wrap a minimum of 3 feet onto the previously uncovered pipe for both layers of polyethylene encasement. This includes lines which may be wrapped in polyethylene or dielectric PVC tape or plastic pipe.
- H. Tape joint overlaps and at 3-foot intervals along the barrel of the pipe (2-foot intervals when installed below the water table). Tightly secure polyethylene encasement using two to three circumferential passes of adhesive tape on the pipe to polyethylene encasement connection and the overlap polyethylene encasement to polyethylene encasement connection for both layers of polyethylene encasement.
- I. Install polyethylene encasement up to the operating nut level on valves, leaving the operating nut of the valve exposed and free to be operated. Install polyethylene encasement so as to not impede valve operation.
- J. Secure polyethylene encasement in place prior to forming or pouring any concrete encasement.
- K. Provide openings in the polyethylene encasement for branches, air valves, blow-off assemblies, and similar appurtenances by making an X-shaped cut in the encasement and temporarily folding back the film. After installation of the appurtenance, tape

the slack securely to the appurtenance and repair the cut and any other damaged areas with tape. Continue installation of polyethylene encasement on pipe branches, overlapping and taping the first piece of polyethylene encasement to the adjacent installation for both layers of polyethylene encasement.

- L. When making direct taps, use the DIPRA preferred method of wrapping tape around the pipe two or three times and tap directly through the tape and polyethylene encasement.
- M. Remove and replace, or satisfactorily repair, any defective or inferior Work that is found on polyethylene encasement with proper material and workmanship and without extra compensation from the OWNER.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 33 05 55

BURIED DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing buried ductile iron pipe, fittings and appurtenances.
 - 1. Provide ductile iron pipe and fittings complete with necessary jointing and materials, specials, adapters and other appurtenances required for installation in and completion of the pipelines to be constructed.
 - 2. Provide plain end or rubber gaskets (push-on or mechanical joint) of the types, sizes and classes shown or specified.
- B. Related Work Specified In Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 01 45 50 - Leakage Test
 - 2. Section 31 23 16 - Excavation
 - 3. Section 31 23 23 - Backfilling
 - 4. Section 33 05 50 - Laying and Jointing Buried Pipelines
 - 5. Section 33 05 54 - Polyethylene Encasement
 - 6. Section 33 05 58 - Cathodic Protection
- C. Comply with the "Use of American Iron and Steel (UAIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specification Section 00 45 49.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ASME B1.1 - Uniform Inch Screw Threads (UN and UNR Thread Form)
 - 2. ASME B16.1 - Grey Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250
 - 3. ASME B18.2 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)

4. ASTM F593 - Standard Specifications for Stainless Steel Bolts, Hex Cap Screws, and Studs
5. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
6. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems
7. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings
8. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
9. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe With Ductile-Iron or Grey-Iron Threaded Flanges
10. AWWA C150/A21.50 - Thickness Design of Ductile-Iron Pipe
11. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast
12. AWWA C153/A21.53 - Ductile-Iron Compact Fittings
13. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances

1.3 SYSTEM DESCRIPTION

- A. Design Standards: Provide ductile iron pipe meeting the requirements of AWWA C150/A21.50 and C151/A21.51.
 1. Provide pipe of the various sizes and classes as specified in the schedule or shown. Provide buried ductile iron pipe encased in polyethylene sheet as specified. Provide restrained joints and various beddings as shown.
 2. Provide pipe laying lengths in 18 or 20 feet nominal lengths with allowable trim pipe lengths in accordance with AWWA C151 and special shorter lengths as required by the Drawings.
 3. Manufacture, fabricate, coat, and line pipe at a single plant location by the approved pipe supplier. Fittings and specials may be fabricated at a site other than where the pipe is manufactured. Conduct testing and application of linings and coatings where the pipe, fitting, or special is manufactured.
 4. Provide concrete encasements where shown.

1.4 SUBMITTALS

A. General: Furnish submittals, including the following, as specified in Division 1.

B. Shop Drawings, Product Data, and Information:

1. For Site Yard Piping at the City of Waukesha's Clean Water Plant:

- a. Pipe joints, fittings, and appurtenances. Where special designs or fittings are required, provide a drawing to show the Work in large detail and completely describe and dimension items.
- b. Catalog data for pipe, joints, fittings, coatings, lining, gaskets, and other appurtenances.
- c. Fully dimensioned drawings of piping layout including pipes, fittings, adapters, appurtenances, valves, supports and anchors. Label pipe size, materials, type, and class on drawings and include limits of restrained joints. Show cross sections with the elevations of appurtenances, pipes, fittings, and valves.
- d. Laying schedule cross referenced to identification marks on the pipeline pieces.
- e. Alignment survey signed and sealed by a land surveyor registered in the State of Wisconsin.

2. For Pipelines (exclusive of yard piping):

- a. Pipe joints, fittings, and appurtenances. Where special designs or fittings are required, provide a drawing to show the Work in large detail and completely describe and dimension items.
- b. Catalog data for pipe, joints, fittings, coatings, lining, gaskets, and other appurtenances.
- c. Laying schedule cross referenced to identification marks on the pipeline pieces.
- d. Alignment survey signed and sealed by a land surveyor registered in the State of Wisconsin.

C. Quality Control:

1. An affidavit from the pipe supplier attesting that plant and equipment capacity is sufficient to perform the required pipe production, testing, fabrication, lining, and coating within the specified Contract Time in accordance with the CONTRACTOR's approved Progress Schedule.

2. Premanufacture notification for ductile iron pipe, fittings, and appurtenances.

1.5 SOURCE QUALITY CONTROL

- A. Work under this Section including the production and testing of pipe, fittings and appurtenances is subject to inspection by the OWNER or the ENGINEER in the pipe supplier's or pipe manufacturer's plant.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products and materials as specified in Division 1 and Section 33 05 50.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Manufacturers of equivalent products may be submitted unless specified otherwise.

1. Ductile iron pipe and fittings: Equivalent products may not be submitted.

- a. AMERICAN
- b. McWane, Inc.
- c. United States Pipe and Foundry Company

2. Ductile iron retainer glands:

- a. EBAA Iron, Inc. MEGALUG Series 1100

3. Ductile iron mechanical joint fittings:

- a. SIP Industries
- b. Star Pipe Products

4. Restrained push-on joints: Equivalent products may not be submitted.

- a. AMERICAN Flex-Ring
- b. McWane, Inc. TR Flex
- c. United States Pipe and Foundry Company
 - (1) TR Flex
 - (2) HDSS

5. Gaskets:

- a. AMERICAN
- b. Garlock Packing Company
- c. John Crane, Inc.
- d. McWane, Inc.
- e. Specification Rubber Products, Inc.
- f. United States Pipe and Foundry Company
- g. U.S. Rubber Company

6. Coatings and Linings:

- a. Carboline
- b. Fulton Enterprises, Inc.
- c. Madison Chemical Industries
- d. Tnemec
- e. Vulcan Coatings

2.2 MATERIALS

- A. Fittings: Provide fittings meeting the requirements of AWWA C153/A21.53 or AWWA C110/A21.10 unless shown or specified otherwise. Provide fittings having a pressure rating meeting or exceeding that specified in the schedule or shown. Match fitting coating and lining to the pipe coating and lining.

- 1. Flanged: Provide flanged fittings as shown. Flanges installed in a buried condition are not acceptable. Where long radius flanged fittings and other flanged fittings not covered in AWWA C110/A21.10 are shown or specified, provide items meeting the requirements of AWWA C110/A21.10 and having laying lengths conforming to ASME B16.1 for 250-pound American Standard fittings.
- 2. Compact Mechanical Joint and Rubber Gasket Joint: Provide restrained joints at fittings as specified in this Section. Unless shown otherwise, provide items meeting the requirements of AWWA C153/A21.53.

- B. Flanged Joints: Provide flanged joints as shown or specified. Flanged joints installed in a buried condition are not acceptable for use on this project.

- 1. Threaded Flanges: Provided threaded, ductile iron long hub flanges meeting the requirements of AWWA C115/A21.15.
 - a. Screw flanges on the threaded end of the pipe in the shop.
 - b. Reface the face of the flange and the end of the pipe together.
 - c. Design flanges to prevent corrosion of the threads from the outside and to prevent leakage through the pipe threads.

2. Facing and Drilling: Provide flanges plain faced and drilled to the requirements of AWWA C115/A21.15, unless special drilling is called for or required. Face flange accurately at right angles to the pipe axis. Drill flanges smooth and true, and cover machined faces with zinc dust and tallow or equivalent material.
 3. Fasteners: Provide bolts, stud bolts, and nuts as specified. Provide bolts with American Standard Heavy unfinished hexagonal heads and nut dimensions meeting the requirements of ASME B18.2. Provide bolts and nuts threaded in accordance with ASME B1.1, Unified Inch Screw Threads (UN and UNR Thread Form) class 2A external and class 2B internal. Provide material for bolts and nuts conforming to Type 304L stainless steel, annealed, ASTM F593, minimum 60,000 psi tensile strength, unless otherwise specified.
 4. Pipe-to-Valve Joints in Vaults: Provide flanged joints for connections to valves in vaults.
 5. Taps: Tap flanges where tap or stud bolts are required.
 6. Gaskets: Provide full-face gaskets for flanged joints on 12-inch diameter and smaller pipe and gaskets of the ring type for flanged joints on larger pipe. Provide flange gaskets meeting the requirements of AWWA C115/A21.15.
- C. Gasket Joints: Provided mechanical joints and push-on joints meeting the requirements of AWWA C110/A21.10, AWWA C111/A21.11, and AWWA C153/A21.53 as applicable.
1. Pipe-to-Pipe Non-Restrained Joints: Provide standard push-on joints for pipe-to-pipe connections as shown in accordance with manufacturer recommendations at non-restrained pipe-to-pipe connections. Provide push-on joints of a type which employs a single elongated groove gasket to provide the joint seal. Mechanical joints are not acceptable for pipe-to-pipe non-restrained joints.
 2. Pipe-to-Pipe Restrained Joints: Provide restrained joints for pipe-to-pipe connections as shown in accordance with manufacturer recommendations of factory-welded retainer bead or ring on the pipe spigot, and either factory manufactured ductile iron locking segments held in place by rubber retainers or ductile iron retaining rings that lock over the bell of the joint and are secured to prevent rotation. Restraining joints by using restrained joint gaskets with integral stainless steel locking segments (including MJ Field-Lok gaskets) are not acceptable for use on the project.
 3. Pipe-to-Fitting Joints and Pipe-to-Buried Valve Joints: Provide restrained mechanical joints using retainer glands for connections to fittings and buried

valves. When restrained joint pipe (with factory-welded retainer bead or ring on the pipe spigot) is used, fittings and valves manufactured with restrained joints compatible with the restrained joint pipe may be used in lieu of fittings and valves with restrained mechanical joints. Non-restrained mechanical joints and non-restrained push-on joints are not allowed for connections to valves or fittings. Restraining joints by using restrained joint gaskets with integral stainless steel locking segments (including MJ Field-Lok gaskets) are not acceptable for use on the project.

4. Pipe-to-Valve Joints in Vaults: Provide flanged joints for connections to valves in vaults as specified in this Section.
 5. Fasteners: Provide bolts and nuts on mechanical joints, except where special bolts are supplied with the approved restraint device, that are high-strength, corrosion resistant, Type 304L stainless steel, annealed, minimum 60,000 psi tensile strength, in accordance with the manufacturers recommendations meeting the requirements of AWWA C111 and ASTM F593. Nuts are to be Xylan or FluoroKote #1 (corrosion resistant) coated.
- D. Special Gaskets: Provide Nitrile gaskets for pipeline joints, blow-off assembly joints, valve joints, and joints of other appurtenances along pipeline reaches as shown.
- E. Connecting Pieces and Special Fittings
1. General: Provide connecting pieces, such as bell and bell, and bell and spigot meeting the requirements of AWWA C110/A21.10 or AWWA C153/A21.53.
 2. Design: Provide special fittings, where required, of an approved design that have the same diameters and thicknesses as standard fittings, unless otherwise required, but their laying lengths and other functional dimensions are determined by their positions in the pipeline and by the particular piping materials to which they connect.
- F. Temporary Bulkheads: Provide temporary bulkheads at the ends of sections where adjoining pipelines have not been completed and are not ready to connect.
1. Remove temporary bulkheads when they are no longer needed.
- G. Linings and Coatings
1. Cement Lining: Provide ductile iron pipe and fittings having a cement-mortar lining not less than standard thickness meeting the requirements of AWWA C104/A21.4, unless shown or specified otherwise. Finish interior of the pipe so that the Hazen-Williams friction factor will not be less than 140.

- a. Repair: Repair cement mortar lining damaged during handling, hauling, storage or installation.
 - 2. Asphaltic Coating: Shop coat pipe which is to be buried with the standard asphaltic outside coating meeting the requirements of AWWA C151/A21.51.
 - 3. Polyethylene Encasement: Provide double-wrapped polyethylene encasement for buried ductile iron pipe and fittings as specified in Section 33 05 54 and meeting the requirements of AWWA C105/A21.5.
 - 4. Labels: Label the supplier's name or trademark, size, pressure class, manufacture date, bend angle turned and locations of short and long sides, and control number cross referenced to the laying schedule conspicuously in white on the outside of each pipe, fitting, and special casting after the shop coat has hardened. Provide cast marks and other marks in accordance with applicable standards.
 - 5. Flange Joints: Immediately after facing and drilling, coat the back of the flanges and bolt holes with asphaltic coating meeting the requirements of AWWA C151/A21.51.
- H. Cathodic Protection: Provide ductile iron pipe with bonded joints and other cathodic protection provisions as specified in Section 33 05 58.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install buried ductile iron pipe and fittings in accordance with the manufacturer's recommendations and approved shop drawings and as specified in Division 1 and Section 33 05 50.
- B. Load, transport, install, and test ductile iron pipe per AWWA C600.
- C. Calibrate test equipment used in activities affecting quality control in accordance with the requirements of the test equipment manufacturer prior to use.

3.2 FIELD QUALITY CONTROL

- A. Cleaning: Flush, clean, and test pipes after installation.
- B. Testing: Test pipes for leaks and repair or tighten as required.
- C. Procedures: Conduct tests in accordance with Section 01 45 50.

3.3 SCHEDULES

- A. Refer to the Schedule contained in Section 33 05 50 Laying and Jointing Buried Pipelines for information on the piping that is to be constructed using the pipe materials and methods specified herein.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 33 05 56

STAINLESS STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing stainless steel pipe, fittings and appurtenances. The Work includes furnishing and installing stainless steel pipe, fittings, and specials buried below grade, in vaults, and above grade of the screwed, welded, or plain end type of the sizes and thicknesses as shown or specified.
- B. Related Work Specified In Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 01 45 50 - Leakage Test
 - 2. Section 31 23 16 - Excavation
 - 3. Section 31 23 23 - Backfilling
 - 4. Section 33 05 50 - Laying and Jointing Buried Pipelines
- C. Comply with the "Use of American Iron and Steel (UAIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specification Section 00 45 49.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ANSI B36.19 - Stainless Steel Pipe
 - 2. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300
 - 3. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings
 - 4. ASME Section IX - BPVC Section IX-Welding, Brazing, and Fusing Qualifications
 - 5. ASTM A197 - Standard Specification for Cupola Malleable Iron
 - 6. ASTM A380 - Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems

7. ASTM A530 - Standard Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe
8. ASTM A778 - Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products
9. ASTM A967 - Specification for Chemical Passivation Treatments for Stainless Steel Parts
10. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings
11. AWWA M11 - Steel Pipe: A Guide for Design and Installation

1.3 SYSTEM DESCRIPTION

- A. Provide stainless steel pipe and fittings of the various sizes, thicknesses, materials, and locations as shown.
- B. Design stainless steel piping for the services and conditions listed in Section 33 05 50 in the Buried Piping Schedule for the purpose of conveying air to and from air valves.
- C. Manufacture pipe so the inside diameter of the pipe is equal to the nominal diameter shown, unless specified otherwise.

1.4 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings, Product Data, and Information:
 1. Screwed and welded fittings and pipe. When special designs or fittings are required, show the Work in large detail and completely describe and dimension the special or fitting.
 2. Fully dimensioned layout of pipe, fittings, wall sleeves, wall sleeve seals, supports, anchors, and equipment. Label pipe size, type and materials on drawing and include schedule. Show types and locations of pipe hangers or supports on the piping layouts for each submittal.
 3. Cross sections showing elevation of pipe, fittings, wall sleeves, wall sleeve seals, supports, anchors, and equipment.
 4. Catalog data for pipe, fittings, wall sleeves, and wall sleeve seals.

C. Quality Control:

1. A certificate of compliance for pipe, fittings, and sleeves that the items are in compliance with the Contract Documents, referenced standards, and “American Iron and Steel (AIS)” requirements.
2. Welder qualification certificates prior to fabrication of pipe.
3. Proposed cleaning method, including precleaning, descaling, chemicals to be used, or mechanical descaling method and final cleaning and passivation.

1.5 QUALITY ASSURANCE

- A. Utilize certified welders, having current certificates conforming to the requirements of the ASME code to perform welding on stainless steel pipe.
- B. Furnish stainless steel pipe by a single manufacturer experienced, reputable, qualified, and regularly engaged for the last 5 years in the manufacture of the materials to be furnished. Design, construct, and install in accordance with the best practices and methods and in accordance with this Section.

1.6 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle products and materials as specified in Division 1 and Section 33 05 50.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Fabricate stainless steel pipe and fittings from stainless steel sheet conforming to ASTM A778 Type 316L with carbon content of 0.03 percent maximum and No. 1 or No. 2B finish.
- B. Furnish pipe die-formed or rolled true to dimension and round with tolerances for length, inside and outside diameter and straightness conforming to ASTM A530. Fabricate the two edges of the sheet brought to line so as not to leave a shoulder on the inside of the pipe. Furnish pipe with ends of the pipe perpendicular to the longitudinal axis. Weld longitudinal seams on pipe and fittings by either tungsten gas or the metallic-gas method with interior welds smooth, even, and without an internal bead higher than 1/16 inches. Mark each piece with gauge and type of stainless steel. Mark the initials of the inspector on the inside of each pipe at each end.
- C. Furnish pipe and fittings with wall thicknesses based on schedule as shown and in accordance with ANSI B36.19.

- D. Pickle, scrub, and wash stainless steel pipe and fittings until discoloration is removed in accordance with ASTM A380 at the point of manufacture. Provide passivation of stainless steel member in accordance with the requirements set forth in ASTM A380 and ASTM A967.
- E. Prepare pipe ends for unions or other type ends where required by transport and handling limitations, where required to support the pipe, and where shown. Assure rigidity of joints where required.
- F. Shop weld fabrications according to the procedures and by welders certified per ASME Section IX. Complete welding by an inert gas shielding process using only extra low carbon filler metals. Provide welds with a bead height of no more than 1/16 inches. Provide butt welds of 100 percent penetration to the interior of backside of the weld joint. Provide cross-sectional thickness of welds equal to or greater than that of the parent metal. Provide welds pickled or passivated on the interior and exterior of the pipe.
- G. Fittings:
 - 1. Manufacture fittings for stainless steel pipe to standard dimensions, suitable for the pressures specified of the smooth curve type conforming to ANSI B16.9. Provide stainless steel fittings of the same or heavier wall thickness and type as the pipe of which they are a part.
 - a. Screwed Fittings:
 - (1) Provide fittings used in pipes 2-inch diameter or smaller of the screwed pattern.
 - (2) Provide malleable iron ASME B16.3 screwed fittings where shown or specified for stainless steel pipe meeting the requirements of ASTM A197.
 - (3) Unions: Where shown, join pipe with unions.
 - (a) Provide an adequate number of unions of the screwed type in each main pipe and each branch to facilitate the dismantling or removal of any branch line or any part thereof or the section of the main pipe to which it connects, without disturbing adjacent branch lines or their related main pipe.
 - b. Welded Fittings:
 - (1) Provide fittings used in pipe 2.5-inch diameter or larger of the seamless stainless steel welded type, except as shown or specified otherwise.

- (2) Provide butt welding fittings meeting the requirements of ASME B16.9.
2. Fabricate stainless steel fittings from the same plates as the pipeline of which they are a part and meeting the requirements of AWWA C208, unless otherwise shown or specified.
3. Provide fittings and elbows that are made of pipe segments of preformed plates.
4. Provide reducers and increasers with the same laying length as American Standard Class 125.
5. Provide tees, wyes, laterals, and outlets reinforced in accordance with AWWA M11.

H. Expansion:

1. General: Make ample provisions for flexibility in pipelines to compensate for expansion.
2. Expansion Device: Provide adequate expansion devices to allow the lines to expand and contract freely without damage to any part of the piping system.
 - a. Provide expansion devices in the form of expansion joints, expansion couplings, swivel or swing joints or pipe bends, and include such anchors as may be shown, specified or required to make the devices effective.
 - b. Provide expansion devices designed for the specified test pressures.
 - c. If expansion devices are not required, fabricate runs of pipe subject to expansion shorter than their theoretical length to the extent that there is freedom to expand without increasing the stresses imposed when cold.

I. Wall Sleeves and Sleeve Seals:

1. Where pipes pass through exterior walls or floors of structures, vaults, and manholes and where wall pipes are not to be provided, provide Type 316 stainless steel pipe sleeves constructed of heavy gauge seamless stainless steel pipe with a full circle continuously welded water stop plate to provide positive sealing and to prevent any thrust movement meeting the requirements of this Section or as shown or specified otherwise. Provide sleeves with ends that are flush with the wall or floor surfaces.

2. Provide sleeves having large enough diameters to accommodate the passage of pipe joints, if required.
 3. Provide sleeves to mate with modular, mechanical sleeve seals, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall sleeve. Provide an elastomeric element that is of the size, quantity, type and material that the manufacturer recommends for the intended service and that will provide an effective hydrostatic seal.
- J. Coatings and Linings: Do not line, coat, or wrap stainless steel pipe and fittings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install stainless steel pipe and fittings in accordance with the manufacturer's recommendations and approved shop drawings and as specified in Division 1 and Section 33 05 50.
- B. During handling and installation, take necessary precautions to prevent carbon impregnation of stainless steel members.
- C. Install pipe and fittings true to grade and alignment and pipe anchorage or restraint provided where required.
- D. Keep pipe and fittings free of dirt, dust, oil, grease, and other foreign matter during installation to prevent damage to pipe and to assure no foreign matter is left in the piping.
- E. To assemble joints in the field, thoroughly clean joint surfaces with soapy water before assembly.
- F. Provide fittings, in addition to those shown, where required considering thermal expansion / contraction over a temperature range of 200 degrees Fahrenheit.
- G. Make field welds as approved by the RESIDENT PROJECT REPRESENTATIVE by welders certified under ASME Section IX. After field welding has been completed, thoroughly clean and buff using deburring and finishing wheels.
- H. Install sleeves of proper size for pipes passing through walls as shown.
- I. When cutting of pipe is required, cut by machine neatly, without damage to pipe. Cut ends smooth and at right angles to the axis of the pipe.

3.2 CLEANUP

- A. After installation, visually inspect stainless steel surfaces for evidence of iron rust, oil, paint, and other forms of contamination.
- B. Remove foreign substances using brushes with stainless steel or nonmetallic bristles.
- C. Clean completed lines with Oakite deoxidizer or similar deoxidizer as recommended by the manufacturer to remove foreign matter, construction stains, or shop markings. Rinse cleaned lines clear with steam or hot water.
- D. After treatment, visually inspect surfaces for compliance.

3.3 FIELD QUALITY CONTROL

- A. Cleaning: Flush clean and test pipes after installation with steam or hot water to remove any foreign material.
- B. Testing: Repair or tighten leaks as required.
- C. Procedures: Conduct leakage tests in accordance with Section 01 45 50.

3.4 SCHEDULES

- A. Refer to the schedule contained in Section 33 05 50 Laying and Jointing Buried Pipelines for information on the piping that is to be constructed using the pipe materials and methods specified herein.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 33 05 58

CATHODIC PROTECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing a cathodic protection system for pipeline comprised of ductile iron pipe, valves, blow-off assemblies, and other appurtenances, including pipe installed using trench excavations and driven and bored casings. Pipeline installed via horizontal directional drilling are not included.
- B. Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 31 23 23 - Backfilling
 - 2. Section 33 05 23 - Jacking, Augering and Mining
 - 3. Section 33 05 50 - Laying and Jointing Buried Pipelines
 - 4. Section 33 05 53 - Buried High Density Polyethylene Pipe and Fittings
 - 5. Section 33 05 54 - Polyethylene Encasement
 - 6. Section 33 05 55 - Buried Ductile Iron Pipe and Fittings
- C. Comply with the "Use of American Iron and Steel (UAIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specification Section 00 45 49.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ANSI/SCTE 77 - Specification for Underground Enclosure Integrity
 - 2. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
 - 3. ASTM G97 - Standard Test Method for Laboratory Evaluation of Magnesium Sacrificial Anode Test Specimens for Underground Applications
 - 4. NACE SP0169 - Control of External Corrosion on Underground or Submerged Metallic Piping Systems
 - 5. NACE TM0497 - Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems

- 6. NFPA 70 - National Electrical Code (NEC)
- 7. UL 44 - Thermoset-Insulated Wires and Cables
- 8. UL 854 - Standard for Service-Entrance Cables

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1. Incorporate manufacturer's product submittals into a single document to demonstrate that the items have been properly coordinated.
- B. Shop Drawings, Product Data, and Information:
 - 1. Manufacturer's physical and chemical specifications or product data for the following items:
 - a. Electrical continuity provisions for ferrous pipe (materials and testing procedure)
 - b. Corrosion monitoring test stations, buried reference electrodes and calibrated wire shunts
 - c. Pipeline current isolation
 - d. Galvanic magnesium anodes
 - e. Wire and cable
 - f. Exothermic welds and coating materials
- C. Quality Control:
 - 1. The CONTRACTOR's Cathodic Protection (CP) Technician's qualifications and prior experience before installation of any cathodic protection components.
 - 2. Spectrographic analysis and electro-chemical properties on samples from each heat or batch of galvanic magnesium anodes supplied for this project in accordance with ASTM G97.
 - 3. Post-installation continuity testing results.
 - 4. Post-Installation Cathodic Protection Testing Report, including a description of the structures intended for protection, a description of the cathodic protection systems, and a tabulation and analysis of the data versus NACE International® performance standards.

D. Operation and Maintenance:

1. Training course curriculum with the proposed training date at least 14 days prior to the date of the training course.

1.4 QUALITY ASSURANCE

- A. Experience Requirements: Furnish the services of an individual certified by NACE International as a Level CP2 Corrosion Technician (CP Technician) to monitor compliance with this Section and to ensure that the cathodic protection system components conform to the applicable plans and specifications established by the Contract Documents.
- B. Technical Assistance: Utilize technical assistance as needed (via telephone) from cathodic protection system material suppliers throughout the duration of the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products and materials as specified in Division 1, Section 33 05 50, and as follows. Provide adequate care to protect cathodic protection materials from damage during handling, storage, hauling, and installation.

1.6 WARRANTY

- A. Provide a two-year warranty for cathodic protection materials, commencing at the time of the final installation after the system has been tested by the CONTRACTOR and approved by the ENGINEER'S CP Specialist.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Manufacturers of equivalent products may be submitted unless specified otherwise.
 1. Cathodic protection materials:
 - a. Mesa Products, Inc., (918-627-3188)
 - b. BK Corrosion, LLC, (713-225-0349)
 - c. T. Christy Enterprises, (800-258-4583)
 2. Insulated stranded copper cable:
 - a. Continental Industries, thermOweld® Jumper Bonds
 - b. ERICO Products, Inc., Cadweld® Bonds – Formed Terminal

3. Corrosion monitoring test stations:
 - a. Non-metallic post and terminal boards:
 - (1) Tinker & Rasor Company, Model T-3
 - b. Flush-mounted test station enclosures:
 - (1) Oldcastle Polymer, Model 1324-12
 - (2) New Basis, Inc., Model PCA132412S
 - c. Prepackaged Cu-CuSO₄ buried reference electrodes:
 - (1) Borin Manufacturing, Inc., Model SRE-007-CUY
 - (2) GMC Electrical, Inc., Model CU-1-UGPC
 - d. Calibrated wire shunts:
 - (1) Tinker & Rasor Company, 0.01-ohm wire shunt with yellow mounting plate rated at 8 amps
4. Pipeline current isolation:
 - a. In accordance with Section 33 05 53 and Section 33 05 55.
5. Galvanic magnesium anodes:
 - a. Mesa Products, Inc.
 - b. BK Corrosion, LLC
 - c. T. Christy Enterprises
6. Wire and cable:
 - a. Graybar Electric Company
 - b. Omni Cable Corp
 - c. Kris-Tech Wire
7. Exothermic welds and connection devices:
 - a. Exothermic welds:
 - (1) Continental Industries, Model thermOweld[®]
 - (2) ERICO Products, Inc., Model Cadweld[®]

b. Covering welds:

- (1) Continental Industries, Model thermOcap® PC
- (2) Chase Corporation, Model Royston Handy Cap® IP

2.2 MATERIALS

A. Electrical Continuity Provisions – Ferrous Pipe:

1. Insulated Stranded Copper Bond Cable:

- a. Provide the quantity and gauge of bond cables as shown. The largest gauge of bond cable for pipe sizes shown may be provided if the weld shots do not damage the pipe wall or its interior lining.
- b. Provide factory-made bond cables with formed copper sleeves installed at both ends of the bond cable using hammer dies as recommended by the manufacturer.
- c. Fabricate bond cables by the same manufacturer as the exothermic weld equipment used to connect the cable to the pipe or structure.
- d. Provide cable constructed of stranded copper equipped with a high molecular weight polyethylene insulation conforming to ASTM D1248, Type 1, Class C, Grade 5 and be configured as follows:
 - (1) No. of Strands: 7
 - (2) Outer Jacket Thickness: 0.110 inches
 - (3) Length: 18 inches minimum. Additional length may be required to bypass valves.

B. Corrosion Monitoring Test Stations:

1. Non-Metallic Posts:

- a. Provide non-metallic conduit posts. Furnish test stations with a capped terminal board equipped with wire or cable binding posts to permit ready access constructed as follows:
 - (1) Terminal Board: Polycarbonate plastic (clear).
 - (2) Test Station Cap: Polycarbonate plastic (color coded by test station type as shown).
 - (3) Conduit Post: UV stabilized polyethylene (white).
 - (4) Binding Posts: Nickel-plated marine brass (6 minimum).

2. Flush-Mounted Test Station Enclosures:

- a. Provide test stations contained in heavy-duty, polymer concrete, flush-to-grade utility enclosures able to withstand incidental traffic and constructed as follows:
 - (1) The open bottom body constructed of polymer concrete having a minimum compressive strength of 87 MPa.
 - (2) The cover constructed of polymer concrete having a non-skid surface covering the body of the enclosure. Provide cover capable of withstanding a minimum of 20,000 pounds without failure in accordance with the requirements ANSI/SCTE 77 Tier 15.
 - (3) Provide cover with a minimum of two hex-capped Type 304 stainless steel hold-down bolts placed at opposite corners and embossed as shown.

3. Prepackaged Cu-CuSO₄ Buried Reference Electrodes:

- a. Description: Use Cu-CuSO₄ electrodes in soil environments to provide a stable electrical benchmark from which to measure the cathodic protection system's effectiveness. Provide electrodes as follows:
 - (1) Element: Copper rod encapsulated in a proprietary backfill electrolyte containing high purity copper sulfate crystals and a chloride ion trap to prevent contamination of the electrolyte.
 - (2) Service life of the reference electrode no less than 20 years.
 - (3) Lead Wire: No. 14 RHH-RHW (yellow) stranded copper wire sufficiently long to reach its termination point without splicing.

4. Calibrated Wire Shunts:

- a. Description: Use color-coded calibrated wire shunts to connect the cathodic protection system's anode header cable and structure return connection circuits.

C. Pipeline Current Isolation:

- 1. Provide pipeline current isolation in soil not contaminated with hydrocarbons, as shown, and as specified in Section 33 05 53 and Section 33 05 55.

D. Galvanic Magnesium Anodes:

1. Description: Provide magnesium anodes capable of delivering a minimum efficiency of 500 amp-hours per pound of magnesium with the following metallurgical analysis:
 - a. Aluminum: 0.01% (max.)
 - b. Manganese: 0.50% - 1.3%
 - c. Copper: 0.02% (max.)
 - d. Nickel: 0.001% (max.)
 - e. Iron: 0.03% (max.)
 - f. Other (each): 0.05% (max.)
 - g. Other (total): 0.30% (max.)
 - h. Magnesium: Balance
2. Packaged Magnesium Anode Backfill: Completely surround the anode ingot in backfill without voids. Provide magnesium anodes packaged within a cotton sack in a special chemical backfill having the following proportions:
 - a. Ground Hydrated Gypsum: 75%
 - b. Powdered Bentonite: 20%
 - c. Anhydrous Sodium Sulfate: 5%
 - d. Provide backfill with a grain size such that 100% is capable of passing a 20-mesh screen and 50% is retained by the 100-mesh screen.
3. Anode Lead Wire:
 - a. Provide standard lead wire for a magnesium anode at least 10 feet in length of No. 12 AWG solid copper wire with Type TW (red) thermoplastic insulation.
 - b. Lead Wire Connection to Anode Core:
 - (1) Cast magnesium anodes with a minimum 20-gauge galvanized steel core.
 - (2) Provide one end of the anode recessed to expose the core for silver-soldering the lead wire.

- (3) Fill the silver-soldered lead wire connection and anode recess with an electrical potting compound before packaging.

4. Magnesium Anode Physical Parameters:

Anode Weight (#)		Nominal Package Dimensions (in.)	
Bare Anode	Packaged Anode	Length	Diameter
48	98	38	8.0

E. Wire and Cable:

1. Structure Return Connection (Direct Burial):

- a. Use high molecular weight polyethylene insulated stranded copper cable for underground portions of the cathodic protection system's anode header cable and structure return connection circuits. Provide insulation conforming to ASTM D1248, Type 1, Class C, Grade 5.
- b. Provide DC cables sized as follows:
 - (1) No. of Strands: 7
 - (2) Outer Jacket: 0.110-inch thickness
 - (3) Gauge and Structure Color Code: No. 8 AWG (color as shown)

2. Test Wires for Cathodic Protection System Monitoring (Direct Burial):

- a. Use cross-linked polyethylene (XLPE) Type RHW-2 and USE-2 for use at 600 volts or less for underground structure connections as part of the cathodic protection system's monitoring circuit. Provide wire insulation conforming to NEC for direct burial, general-purpose applications at a maximum continuous operating temperature of 90 degrees C in either wet or dry locations.
- b. Provide test wires as follows:
 - (1) Provide conductors that are Class B stranded annealed uncoated copper per UL 854 and UL 44.
 - (2) Primary Insulation: 0.045-inch thickness
 - (3) Gauge and Structure Color Code: #12 AWG (colors as shown)

F. Exothermic Welds and Connection Devices:

1. Make connections used within the DC cathodic protection system circuit by exothermic welds.
 - a. Provide the proper size welders, metal charges, and wire sleeves in accordance with the manufacturer's recommendations. Do not mix different manufacturers' products.
 - (1) When connecting to horizontal ductile iron or cast iron structures, use a maximum of 32-gram weld metal charge and furnaces designated specifically for cast iron.
 - (2) When connecting to horizontal carbon steel structures, use a maximum of 25-gram weld metal charge and furnaces designated specifically for carbon steel.
2. Covering of Welds: Provided pre-fabricated plastic sheet with an igloo-shaped dome and entry tunnel filled with an oil-and gas-resistant elastomeric rubber.

PART 3 EXECUTION

3.1 PREPARATION

- A. Examine the areas and conditions under which cathodic protection materials are to be installed and notify RESIDENT PROJECT REPRESENTATIVE in writing of conditions detrimental to the proper and timely completion of the Work as needed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Provide cathodic protection components and equipment as shown.
- B. Electrical Continuity Provisions – Ferrous Pipe:
 1. General: Install factory-made bond cables across non-welded ferrous pipe joints except as follows:
 - a. Pipe joints that are specifically required to be electrically isolated.
 - b. Bond around valves - do not connect bond cables to valve housing.
 - c. Pipe joints exposed within vaults.

2. Method:
 - a. Inspect each bond cable to ensure a continuous electrical conductor with no cuts or tears in the cable insulation.
 - b. Attach bond cable to pipeline by the exothermic welding process in accordance with the manufacturer's instructions.
 - c. Do not use any exothermic weld equipment that is either damp or wet.
 - d. Cover exothermic welds with a pre-fabricated, igloo-shaped, domed-plastic elastomeric rubber cover in accordance with the requirements of this Section.
3. Post-Installation Visual Inspection: Inspect electrical continuity bond cable connections by visually examining each exothermic weld connection for strength and suitable coating prior to backfilling.
4. Post-Installation Continuity Testing: Verify bonded pipe joints are electrically continuous prior to backfilling as follows and shown.
 - a. Measure the electrical potential at each side of selected bonded connections with a portable copper/copper-sulfate reference electrode (CSE) and a digital voltmeter having at least 10 mega-ohm input impedance.
 - b. Place the CSE, connect the leads, measure and record the DC voltage, and verify an acceptable connection as shown.
 - c. Document data and furnish post-installation continuity testing results each day to the RESIDENT PROJECT REPRESENTATIVE. Summarize and furnish post-installation continuity testing results to the ENGINEER at the completion of the project.
5. Acceptance Criterion: Remove and replace deficient welded connections at no expense to the OWNER that are not acceptable in accordance with the requirements of this Section or as directed by the RESIDENT PROJECT REPRESENTATIVE.
6. Backfilling of Bond Cables:
 - a. Prevent damage to the bond cables and connections to the pipeline during backfilling.
 - b. If construction activity damages bond cable, remove and replace the bond cable at no expense to the OWNER.

C. Corrosion Monitoring Test Stations:

1. General: Install the required number of test stations as shown or as directed by the RESIDENT PROJECT REPRESENTATIVE.
2. Buried Reference Electrode:
 - a. Keep buried reference electrodes dry and protect from freezing before installation.
 - b. Remove plastic or paper shipping bags from around the reference electrode prior to installation.
 - c. Place reference electrode in native soil as shown.
 - d. Splices are not permitted within the length of a factory-fabricated reference electrode lead wire.
3. Test Wires:
 - a. Provide test station lead wires that are continuous with no cuts or tears in the insulation covering the conductor.
 - b. Attach test leads to the pipeline by the exothermic welding process.
 - c. Connect test station wires to one side of the terminal board using the test station manufacturer's standard binding posts at the locations shown.
 - d. Install wire shunt plate and shorting bars to the opposite side of terminal board from the incoming wires.
 - e. Install wire shunt plate last to permit easy removal from terminal board without having to disassemble other test station wire and cable connections.
4. Terminal Board and Test Stations within Flush-Mounted Enclosure:
 - a. Extend test station wires without splicing to a point located behind curb lines. Do not place test stations in areas subject to vehicular traffic or accumulated standing water.
 - b. Route test station wires through the mounting pipe and secure the test station terminal board to the top of the pipe. Extend the pipe vertically to allow at least 24 inches of pipe to remain below the bottom of the enclosure.
 - c. Install the top of test station head and color-coded cap to allow a minimum separation of 1 inch from the underside of the enclosure

cover. Permanently mark pipeline stationing number on test station cap or mounting post.

- d. Set the top of the enclosure flush to final grade and support with gravel base as shown to drain the inside of the enclosure.
- e. Fasten the two hold-down bolts of the enclosure lid but do not over tighten.
- f. Thoroughly backfill and compact the soil surrounding the enclosure to prevent settling and voids.
- g. Drive a vertical 12-inch long steel rebar flush into the ground and immediately alongside the enclosure to facilitate locating with a magnetic sensing device.
- h. Furnish and install reinforced concrete pad as shown.

5. Post-Installation Backfilling:

- a. Protect test leads during the backfilling operation to avoid damage to the wire insulation and integrity of the conductor.
- b. Protect buried reference electrode during backfilling to avoid damage to the electrode and its lead wire.
- c. If, in the opinion of the RESIDENT PROJECT REPRESENTATIVE, the installation of the test station wires or the reference electrode is deficient, remove and replace these components at no expense to the OWNER.

D. Pipeline Current Isolation:

- 1. General: Provide pipeline current isolation as shown or as directed by the RESIDENT PROJECT REPRESENTATIVE and as specified in Section 33 05 50, Section 33 05 53, and Section 33 05 55.

E. Galvanic Magnesium Anodes:

- 1. General: Install anodes as shown or as directed by the RESIDENT PROJECT REPRESENTATIVE.
- 2. Method:
 - a. Remove plastic or paper shipping bags from around prepackaged anodes prior to installation.

- b. Install in the manner and at the dimensions from the pipeline as shown. Make field modifications only with the approval of the RESIDENT PROJECT REPRESENTATIVE.
- c. Handle galvanic anodes in such a manner to avoid damaging anode materials and wire connections.
- d. Route anode lead wire directly to pipe or test station as shown.
- e. Splices are not permitted within the length of a factory-fabricated anode lead wire.
- f. Install prepackaged anodes with compacted backfill material, such that no voids exist between the anode material and the backfill.
- g. In soils that do not exhibit any signs of moisture content or granular soils that have no cohesive strength, pour 5 gallons of water over the anode after backfilling and tamping have been completed to a point about 6 inches above the anode. After the water has been absorbed by the earth, backfill to finished grade.

F. Wire and Cable:

- 1. Install underground wires, cables, and connections at least 36 inches below finished grade and at least of 6 inches from other underground structures.

G. Exothermic Welds and Connection Devices:

- 1. Exothermic Welds:
 - a. Provide exothermic welds as shown.
 - b. Follow manufacturer's instructions for proper use of welding equipment, weld metal charge size, and applicability to the structure.
 - c. Do not use exothermic weld equipment if the graphite mold is wet.
 - d. Use proper personnel protective equipment when handling and performing exothermic welding.
- 2. Elastomeric Cover over Exothermic Welds:
 - a. Provide elastomeric cover over exothermic welds as shown.
 - b. Follow manufacturer's instructions for proper storage and handling.
 - c. Do not apply to pipe surface without proper surface preparation.

3.3 FIELD QUALITY CONTROL

A. Post-Installation Testing of Cathodic Protection Systems:

1. General: ENGINEER will provide services of a NACE-CP Specialist for periodic field inspections and technical oversight of the CONTRACTOR's commissioning services of the cathodic protection system in accordance with the NACE SP0169 (latest edition) and NACE TM0497.
2. After installation of the cathodic protection system, perform the following field tests by the CP Technician furnished by the CONTRACTOR:
 - a. Take photographs of each test station, both of the terminal board and also the surrounding landscape, for future identification and locating.
 - b. Verify that each test station wire is attached to the appropriate structure using the proper color code.
 - c. Measure cathodic protection data at each test station as follows:
 - (1) Red Cap Anode Test Station: ON S/S potentials of the pipeline using the buried reference electrode and a portable Cu-CuSO₄ reference cell. Momentarily disconnect the anode(s) from the circuit and record Instant-Off S/S potentials of the pipeline using the buried reference electrode and a portable Cu-CuSO₄ reference cell. Measure the total current through the anode circuit via the TS shunt.
 - (2) Blue Cap Casing Test Station: Structure-to-soil potentials of the pipeline and the casing using the buried reference electrode and a portable Cu-CuSO₄ reference cell.
 - (3) Green Cap Potential Test Station: Structure-to-soil potentials of the pipeline using the buried reference electrode and a portable Cu-CuSO₄ reference cell.
 - (4) White Cap Foreign Test Station: Structure-to-soil potentials of the pipeline and the foreign structure using the buried reference electrode and a portable Cu-CuSO₄ reference cell. Note any DC interference to the pipeline.
 - d. Furnish a Post-Installation Cathodic Protection Testing Report in accordance with the requirements of this Section.
3. Training Session: Provide a field training session to the OWNER for the operation and maintenance of the cathodic protection system as specified in Division 1 and as follows.

- a. Start training after the system is functionally completed but prior to final acceptance tests.
 - b. Provide training consisting of a demonstration of routine maintenance operations, including testing procedures, standard test equipment, data collection forms, and the minimum performance standards used to indicate that the cathodic protection system is functioning properly.
4. Final Acceptance: Assist the ENGINEER's CP Specialist after energizing and commissioning of the cathodic protection system to ensure that deficiencies are corrected prior to acceptance by the RESIDENT PROJECT REPRESENTATIVE.
- a. The costs for any additional field tests or inspections by the ENGINEER's CP Specialist that result from either material or installation deficiencies will be charged to the CONTRACTOR at direct cost with no mark-up and deducted from the CONTRACTOR's final pay application for the project.
 - b. The cathodic protection system installation will be deemed acceptable for full payment only after being tested by the CONTRACTOR's CP Technician and determined to meet the minimum performance criterion established in this Section by the ENGINEER'S CP Specialist.

END OF SECTION

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SECTION 33 05 61

PIPELINE VAULTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing precast reinforced concrete vaults and other appurtenances for a complete installation. Provide vaults built without steps and as shown. Except as otherwise specified, construct vaults of precast reinforced concrete sections conforming to ASTM C890 and C913.
- B. Related Work Specified In Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 31 23 16 - Excavation
 - 2. Section 31 23 23 - Backfilling
 - 3. Section 33 05 50 - Laying and Jointing Buried Pipelines
 - 4. Section 40 05 01 - Supports and Anchors
- C. Comply with the "Use of American Iron and Steel (UAIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specification Section 00 45 49.

1.2 REFERENCE

- A. Codes and standards referred to in this Section are:
 - 1. AASTHO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings
 - 2. ACI 318 - Building Code Requirements for Structural Concrete and Commentary
 - 3. ASTM A48 - Standard Specification for Gray Iron Castings
 - 4. ASTM A615 - Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement
 - 5. ASTM C836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course

6. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Reinforced Concrete Utility Structures
7. ASTM C890 - Standard Practices for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
8. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures
9. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
10. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
11. ASTM D412 - Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers – Tension
12. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
13. ASTM D3574 - Standard Test Methods for Flexible Cellular Materials – Slab, Bonded, and Molded Urethane Foams
14. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings, Product Data and Information:
 1. Vaults, reinforcing, joints, preformed joint sealant, resilient connectors, concrete admixture, internal chimney seal, rubber manhole adjusting rings, manhole frames and covers, and waterproofing system.
 2. A table or chart showing the specific sections and the orientation of vault penetrations for each vault supplied.
- C. Quality Control:

1. A certificate signed and sealed by a Licensed Professional Engineer experienced in Structural Engineering and registered in the State of Wisconsin that certifies that the Licensed Professional Engineer has evaluated and approved the CONTRACTOR's design of the vaults as detailed on the submittal drawings and has prepared complete design calculations confirming the adequacy of the vaults. Provide a separate certificate for each vault size and type.
2. A certificate of compliance for vaults and appurtenances attesting that the items are in compliance with the Contract Documents, referenced standards, including proof-of-design testing, and "American Iron and Steel (AIS)" requirements.
3. Mix data and test reports from an approved testing laboratory certifying that concrete used in precast structures conforms to specified requirements.

1.4 QUALITY ASSURANCE

- A. Provide vaults that are produced by an experienced manufacturer regularly engaged in the production of such items and free of defects, spalls, and cracks. Take care in the mixing of materials, casting, curing and shipping to avoid defects, spalls, and cracks. The OWNER's representative may elect to examine the units at the casting yard or upon arrival at the project site.
- B. Materials are subject to rejection for failure to meet requirements of this Section or may be rejected due to any of following:
 1. Fractures or cracks passing through wall, except for a single end crack that does not exceed depth of joint.
 2. Defects indicating mixing and molding not in compliance with ASTM C913, surface defects indicating honey-combed or open texture.
 3. Plane of ends of section are not perpendicular to longitudinal axis within tolerances.
 4. Damaged or cracked ends that prevent making a satisfactory joint.
 5. Any continuous crack having a surface width of 0.01 inch or more and extending for a length of 12 inches or more regardless of position in section wall.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle products as specified in Division 1 and as follows. Take care to prevent damage to the vault sections during transportation and unloading. Unload vault sections using skids, pipe hooks, rope slings, or

suitable power equipment, and keep the sections under control. Do not allow the vault sections to be dropped, dumped or dragged.

- B. Do not transport vaults away from the casting yard until the concrete has reached the minimum required 28-day compressive strength and a period of at least 5 days has elapsed since casting.
- C. Do not transport precast members from the manufacturing plant to the project site prior to approval of that member by the plant inspector. Apply a stamp on the member indicating approval by the plant inspector.
- D. Damaged Section: If any vault section is damaged in the process of transportation or handling, reject and immediately remove such sections and structures from the site, and replace the damaged vault sections.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted.
 - 1. Precast Reinforced Concrete Vaults:
 - a. Concrete Specialties, Inc.
 - b. County Materials Corporation
 - c. Crest Precast Concrete, Inc.
 - d. Oldcastle Infrastructure, Inc.
 - 2. Concrete Admixture:
 - a. IPA Systems, Inc., IPANEX
 - b. W.R. Grace & Co., Force 10,000 D
 - 3. Preformed Joint Sealing Compound:
 - a. Hamilton-Kent, Kent-Seal
 - b. Henry Company, Ram-Nek
 - 4. Resilient Connectors:
 - a. Press-Seal Corporation, PSX: Positive Seal
 - b. Trelleborg Pipe Seals, Kor-N-Seal

5. Waterproofing System:
 - a. Grace Construction Products, Procor Fluid Applied Membrane (Below Grade)
 - b. Carlisle Coatings & Waterproofing, Inc., Barricoat-S.
 - c. BASF Building Systems Chemicals – Sonneborn Products, HLM 5000.
6. Manhole Frame and Cover:
 - a. Neenah, Type R-1562 (for 30-inch)
7. Wall Sleeve Annular Seals
 - a. GPT Industries, Link-Seal®

2.2 MATERIALS

- A. General: Provide vaults as determined by the CONTRACTOR's Licensed Professional Engineer registered in the State of Wisconsin, as recommended by the manufacturer and conforming to ASTM C890 and C913.
 1. Take sole responsibility for the design and adequacy of vaults, including vault details not shown on the Drawings.
 2. Provide vaults such that the live load surcharge from railroads, roads, structures, utilities, or other items adjacent to the vaults are accounted for and in accordance with the requirements of the local authority having jurisdiction. At a minimum, design vaults to support own weight and live load equivalent to HS-20 Highway Loading.
 3. Design vaults to prevent flotation without benefit of skin friction when ground water level is at finished grade. Provide concrete pad if required to prevent flotation.
 4. Design vaults with precast or cast-in-place vault base as shown.
- B. Concrete, Steel Reinforcement and Aggregates:
 1. Provide reinforced concrete, cementitious materials, aggregates and steel reinforcement conforming to the requirements of ASTM C890 and C913. Provide minimum compressive strength of 4,000 psi at 28 days where concrete mix proportion is in accordance with ACI 318.
 2. Provide reinforcing bars that are billet steel grade (60,000 psi minimum yield) conforming to the requirements of ASTM A615, Grade 60 or as

determined to be required for the application. Provide reinforcing bars that are new stock, free from rust, scale, or other coatings that tend to destroy or reduce bonding.

- C. Concrete Admixture: Provide vaults with waterproofing admixtures to provide water-tight construction. Use minimum dosage requirement for IPANEX waterproofing admixture of 14 oz. per 100 lb. of cement. Use minimum dosage requirement for Force 10,000 D microsilica of 10 percent by weight of cement.
- D. Preformed Mastic Joint Sealing Compound: Provide preformed mastic joint sealing compound for joining vault base and wall sections in accordance with the requirements of ASTM C990.
- E. Butyl Rubber Backplaster: Provide trowelable grade butyl rubber base backplaster material to seal exterior vault joints and adjusting rings.
- F. Resilient Connectors: Provide resilient connectors conforming to ASTM C923 for joining pipelines to vault riser sections. Provide resilient connectors that are either casted integrally into the wall of the vault section or installed by mechanical means in openings cut into the vault wall per ASTM C923. Provide each resilient connector of a size specifically designed for the opening size, pipeline outside diameter and pipeline material and allow for up to 7 degrees deflection in pipe alignment.
- G. Grout: Provide cement grout composed of Portland cement and sand. Provide grout proportions consisting of one part Portland cement to three parts sand. Provide water amount as required to achieve desired consistency without compromising strength requirements. Mix white Portland cement with the Portland cement as required to match color of precast concrete. Provide cement grout for joint grout having a minimum compressive strength at 28 days of 4,000 psi.
- H. Rubber Manhole Adjusting Rings: Provide HS-20 rated rubber manhole adjusting rings conforming to ASTM D3574 for adjusting frame and cover elevation.

- I. Waterproofing: Provide self-curing, synthetic rubber based, fluid applied waterproofing membranes meeting or exceeding the performance requirements of ASTM C836 and as follows:

<u>Property Value</u>	<u>Test Method</u>	<u>Typical Value</u>
Hardness, Shore OO:	ASTM C836	85
Tensile Strength	ASTM D412	150 psi
Moisture-Vapor Permeability (dry perms)	ASTM E96	0.10 perms maximum
Crack Bridging Test	ASTM C836	Passed 1/16-inch
Elongation	ASTM D412	500 percent minimum
Peel Adhesion to Concrete	ASTM D903 ⁽¹⁾	5 lbs/inch

a. Notes:

- (1) Apply waterproofing membrane to concrete and allow to cure. Measure membrane peel adhesion at rate of 2 inches per minute with peel angle of 90 degrees at room temperature.

2. Prefabricated Drainage Composite: Design drainage composite to promote positive drainage while serving as a protection course.
3. Miscellaneous Materials: Provide tape and other accessories specified or as recommended by the manufacturer of fluid applied waterproofing membrane.

- J. Manhole Frames and Covers: Provide HS-20 rated frames and covers conforming to ASTM A48, Class 35B for vaults. For installations in roadways or where required, provide heavy duty manhole frame and cover. Provide flush mounted covers unless otherwise indicated. Emboss manhole covers as shown. Supply castings showing the name of the manufacturer, the country of manufacture, ASTM material designation, individual part number, and cast or heat date. Mark pairs of machined castings to facilitate subsequent identification during installation. Do not paint castings during fabrication.

- K. Sump: Provide sump in the vault floor as shown.

- L. Pipe, Fittings, Valves, and Supports: Provide pipe, fittings, valves, and supports as shown or specified.

- M. Modular, Mechanical Sleeve Seals: Provide modular, mechanical type seals consisting of interlocking, synthetic-rubber links shaped to continuously fill the annular space between the pipe and the sleeve. Provide an elastomeric sealing element that is of the size, quantity, type and material that the manufacturer recommends for the intended service and that will provide an effective hydraulic seal. Provide stainless steel bolts and nuts.

2.3 CONSTRUCTION

- A. Precast Reinforced Concrete Vaults: Provide vaults that are watertight and conform to the requirements of ASTM C857.
- B. Vault Base Section: Unless otherwise shown, provide vault base sections consisting of a base riser section with an integral floor. Form and cast pipeline opening with integral base and riser section, or as recommended by the manufacturer. Provide cast-in-place concrete vault base sections for vaults intended to house air valves as shown.
- C. Vault Tops: Provide flattops as shown.
- D. Rubber Manhole Adjusting Rings: Provide rubber manhole adjusting rings of a nominal thickness not less than 2 inches.
- E. Identification: Clearly mark the following information inside each precast section and the top and bottom surfaces of slabs.
 - 1. ASTM designation
 - 2. Utility structure size
 - 3. Date of manufacture
 - 4. Name or trademark of manufacturer

2.4 SOURCE QUALITY CONTROL

- A. Carefully inspect each vault prior to installation. Replace those not meeting the specifications.
- B. Acceptance: Base acceptance of vaults on passing a proof-of-design test in accordance with ASTM C890 and C913.
- C. Manhole Frame and Cover:
 - 1. Load Test: Proof load test the first article of each traffic service casting in accordance with the method and procedure outlined in AASHTO M306, Section 7.0. Maintain test results at the foundry for 7 years. Furnish the results of the proof load tests upon request.

2. Weight: Reject castings with a weight which is less than the theoretical weight based on required dimensions by more than 5 percent. Provide facilities at the site for weighing castings, or furnish invoices showing true weights, certified by the supplier.
3. Certification: Furnish a foundry certification stating that samples representing each lot have been tested, inspected, and are in accordance with this specification.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Excavation and Backfill: Excavate area for vault structure in accordance with Section 31 23 16 and to depth required as shown.
 1. Limit horizontal excavation to outside diameter of vault structure plus sufficient exterior clearance to allow a safe work area.
 2. Where groundwater is present in bottom of vault excavation, remove water by pumping, maintain free of water.
 3. Place select fill as specified in Section 31 23 23 under vault base.
 4. Allow joints to set for a minimum 24-hour period before backfilling.
 5. Perform backfilling carefully, bringing fill up evenly on all sides.
 6. Compact fill around vault with a mechanical hand operated wacker.
- B. Lift Holes: Provide lift holes that are formed, tapered, or drilled. Repair lift holes using a conical shaped precast plug, properly sealed in place using non-shrink cement grout or an expanding Portland cement mixture such as Octocrete.
- C. Openings: If required, locate openings or “knockouts” in vaults as shown and size sufficiently to permit passage of the largest dimension of pipe. Make the diameter of such openings to be not more than 4 inches larger than the outside diameter of the pipe to be connected. Unless otherwise shown or approved, provide 6 inches minimum distance between a joint in a vault section and the nearest edge of an opening for a connecting pipeline.
- D. Vault:
 1. Manufacture riser sections with openings properly located for making connections as recommended by the manufacturer.

2. Set base section, align pipe sleeve openings to provide straight alignment of pipe through vault, and level and plumb section.
3. Set vault and flattop at a grade so that no more than the maximum height of mechanically mounted rubber internal chimney seals shown are required to bring manhole frame and cover to finished grade.
4. Place sections vertical and in true alignment with a maximum 1/4-inch tolerance per section.
5. Plug holes in sections required for handling or other purposes with a non-shrink grout, finished flush on inside.

E. Joints:

1. Join sections with preformed joint sealing compound in accordance with the sealing compound manufacturer's recommendations.
2. Install sufficient sealing compound to show a "squeeze-out" on the outside of the joint.
3. Apply trowelable grade butyl rubber backplaster material 1/4-inch minimum thickness, when dry, on the outside of the vault at each joint, extending 6 inches above and below the joint.
4. Apply butyl rubber backplaster on the outside of the flattop from 3 inches below the bottom adjustment ring on the flattop section to, and covering, the adjustment rings just below the casting.
5. Apply shrink wrap or visquine to the outside of each joint to further seal the vault after applying butyl rubber backplaster.
6. Clean off all excess joint sealing compound from the inside surfaces.

F. Resilient Connectors:

1. If an additional pipe sleeve is required in base section due to changed conditions, provide hole in section prior to setting that section. Core hole in section of sufficient diameter to accommodate pipe and pipe sleeve, using care not to crack or splay concrete.
2. After installation of resilient connectors, grout pipe connections inside vault in accordance with manufacturer's recommendations.

G. Rubber Manhole Adjusting Rings and Flattop Seal:

1. Provide a water tight seal between the vault and adjusting ring, between each adjoining adjusting ring, and between the adjusting ring and casting by the use of two rows of 1/2-inch extrudable preformed gasket material, trowelable grade butyl rubber, or an approved manufacturer's recommendation.
2. Provide an internal chimney seal, based on the manufacturer's recommendation, after extrudable preformed gasket material or trowelable grade butyl rubber is installed.

H. Waterproofing:

1. Provide substrate surfaces free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.
2. Provide substrate surfaces that are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.
3. Ensure items penetrating surfaces to receive waterproofing are securely installed.
4. Verify substrate surface slopes to drain for horizontal waterproofing applications.
5. Install waterproofing in accordance with the manufacturer's recommendations, including the following:
 - a. Apply minimum 60 mils DFT in areas to be waterproofed. Apply minimum 120 mils DFT in detail areas.
 - b. If area to be waterproofed is in direct sunlight and temperature is rising, apply "scratch coat" (a thin application of fluid applied waterproofing) prior to full application of waterproofing membrane.
 - c. In applications where a minimum slope of 0.13 inch/foot cannot be achieved, two coat application of membrane may be needed to achieve total thickness.
 - d. Apply protection board and related materials in accordance with manufacturer's recommendations.

I. Manhole Frame and Cover:

1. Set manhole frame on 1/2-inch extrudable preformed gasket material, trowelable grade butyl rubber, or an approved manufacturer's recommendation.

2. In paved areas, match top of casting with finished grade; in unpaved/grassy areas, install casting so that the top extends at least 3 inches above finished grade, and grade surface to provide positive surface drainage away from vault.
3. Firmly embed manhole frames in mortar.

J. Pipe, Fittings, Valves, and Supports:

1. Install pipe, fittings, valves, and supports as shown, specified, or recommended by the manufacturer.
2. Place valves plumb and level valve, and assure adequate bearing of valve and pipe on supports.

3.1 LEAKAGE TESTING

A. Exfiltration Test:

1. Prior to and during exfiltration test reduce groundwater level to below vault base. Demonstrate to RESIDENT PROJECT REPRESENTATIVE that water table is below bottom of vault. Suitably plug and brace open pipes and other openings into vault to prevent blowout.
2. Fill vault with water to top of cone section or underside of flat top.
 - a. If vault has not been backfilled and visual inspection of exterior by RESIDENT PROJECT REPRESENTATIVE reveals no leaks, vault may be considered to be satisfactorily watertight.
 - b. If vault has been backfilled or visual inspection is not satisfactory, allow water to remain in vault for a period of 4 hours to provide for absorption.
 - (1) Bring water in vault to top again and allow water to remain for a period of 8 hours minimum.
 - (2) At end of time period, add water to vault to return level to top. Measure and record quantity added.
 - (3) Extrapolate amount of water to a 24 hour time period and determine rate of exfiltration per vertical foot and confirm leakage for each structure does not exceed 1 gallon per vertical foot per day.

- (a) If vault does not meet leakage requirement but does not exceed 3 gallons per vertical foot per day, RESIDENT PROJECT REPRESENTATIVE may permit repairs to structure to reduce leakage to required value.
 - (b) Leakage due to defective section or in excess of 3 feet per vertical foot per day will be cause for rejection.
 - B. Reseal joints found to be unacceptable by RESIDENT PROJECT REPRESENTATIVE.
 - C. Take responsibility for uncovering, disassembling, reconstructing, or replacing vaults as directed by RESIDENT PROJECT REPRESENTATIVE. Upon reconstruction, retest vault for compliance.
- 3.2 CLEANING
- A. Thoroughly clean vault of silt, debris, and foreign matter of any kind prior to final inspection.

END OF SECTION

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SECTION 33 05 70

LOCATING BURIED PIPELINES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing marking tape, tracer wire, tracer boxes, and Electronic Marker System (EMS) markers.
- B. Related Work Specified in Other Sections Includes, but is Not Limited to, the Following:
 - 1. Section 31 23 23 - Backfilling
 - 2. Section 33 05 50 - Laying and Jointing Buried Pipelines
 - 3. Section 33 05 53 - Buried HDPE Pipe and Fittings
 - 4. Section 33 05 55 - Buried Ductile Iron Pipe and Fittings

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. APWA - American Public Works Association
 - 2. ASTM A48 - Standard Specification for Grey Iron Casting
 - 3. ASTM D882 - Standard Test Method for Tensile Properties of This Plastic Sheeting
 - 4. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
 - 5. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting
 - 6. ASTM D2578 - Standard Test Method for Wetting Tension of Polyethylene and Polypropylene Films
 - 7. ASTM D2582 - Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting

1.3 SYSTEM DESCRIPTION

- A. Provide marking tape, tracer wire, tracer boxes, EMS markers, and other associated materials complete in place as shown or specified.

1.4 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings, Product Data, and Information:
 - 1. Catalog data, descriptive literature, installation and operation and maintenance instructions for marking tape, tracer wire, tracer boxes, EMS markers, and appurtenances. Label dimensions, materials, type, markings, and color.
 - 2. Notification that EMS markers are in place prior to surface restoration, including permanent paving, seeding, or sodding.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products and materials as specified in Division 1 and as follows.
 - 1. Take every precaution to prevent damage to the products during transportation and delivery to the site.
 - 2. EMS Markers:
 - a. Store EMS markers in their shipping packaging until installation.
 - b. Do not store EMS markers in direct sunlight or at temperatures beyond the limits of 40 to 158 degrees Fahrenheit.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Manufacturers of equivalent products may be submitted.
 - 1. Marking Tape:
 - a. Proline Safety Products
 - b. Reef Industries, Inc
 - c. Seton – A Brady Corporation Company
 - 2. Tracer Wire:
 - a. Copperhead Industries
 - b. DURAtace

3. Full Range EMS Markers:

a. 3M

2.2 MATERIALS

- A. Marking Tape: Provide marking tape manufactured of polyethylene with chemically inert tape and ink resistant to alkalis, acid and other destructive agents. Furnish marking tape with a background color as listed per APWA color code standards and imprinted with abrasion-resistant black letters using permanent ink, where the imprint repeats itself a minimum of once every 2 feet for the length of the tape. Provide tape conforming to the following requirements:

Property	Method	Value
Overall Thickness	ASTM D2103	4.0 mil minimum
Weight	ASTM D2103	18.5 lbs./1000 sq. ft.
Tensile Strength	ASTM D882	3200 psi (38 lbf. for 3" tape)
Elongation	ASTM D882	800%
PPT Resistance	ASTM D2582	15.5 lbf.
Printability	ASTM D2578	>= 40 Dynes

PIPELINES

Width	--	3 inches
Tape Color	APWA	Green
Imprint (black)	--	"CAUTION – SEWER LINE BELOW"
Type		Non-Detectable

FIBER OPTIC CABLE

Width	--	In common trench: 3 inches In dedicated trench: 6 inches
Tape Color	APWA	Orange
Imprint (black)	--	"CAUTION – FIBER OPTIC CABLE BELOW"
Type		Detectable

B. Tracer Wire:

1. Open Cut and Jacking Installations: Provide direct burial #10 or #12 AWG, 21% conductivity solid annealed copper-clad, carbon steel core high-strength tracer wire, with at least 430 pounds average tensile break load, minimum 10% elongation, with 30 mil high-molecular weight, high-density, polyethylene jacket complying with ASTM D1248, 30 volt rating.
2. Horizontal Directional Drilling (HDD) Installations: Provide direct burial #8 or #10 AWG, 21% conductivity solid annealed copper-clad, high-carbon steel core (HS-CCS) hard drawn extra-high strength HDD tracer wire with at least 1,150 pounds average tensile break load, minimum 1% elongation, with 45 mil high-molecular weight, high-density, polyethylene jacket complying with ASTM D1248, 30 volt rating. No splices are permitted on tracer wire installed by HDD.
3. Provide green wire color per APWA color code.
4. Provide wire insulation made of HDPE and highly resistant to alkalis, acid and other destructive agents found in soil. THHN coating is not acceptable.
5. Provide tracer wire with water-blocking characteristics, corrosion resistance, and UV protection.
6. Encase splices with a waterproof connector rated at 30 volts for direct bury and submersion applications that is recommended by the wire manufacturer for the intended application and installation method. Furnish connectors by the same supplier as the wire.

C. Tracer Boxes:

1. Provide tracer wire boxes in accordance with ASTM A48 Class 30.
2. Provide tracer boxes that are 18-inches long, adjustable-to-grade, 4-inch inside diameter, ABS plastic box flared and squared at base with a 1-inch cast iron flange at top for heavy-duty installation at grade. Provide lids that are one piece locking cast iron with "Test Station" marked on lid and containing 5 screw-type brass terminals (or other quantity as approved) on a non-conductive terminal board, and secure in place beneath the lid.

D. EMS Markers:

1. Provide flat 15-inch diameter full range EMS markers locatable up to 8 feet underground and having unique frequency for signal positive identification.
2. Provide green EMS marker color per APWA color code.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Marking Tape: Install marking tape directly above pipe bedding enveloping pipeline and appurtenances as shown or specified and in accordance with the manufacturer's recommendations.
- B. Tracer Wire:
 - 1. Install tracer wire with pipeline and appurtenances as shown or specified and in accordance with the manufacturer's recommendations.
 - a. For pipe installed via open cut:
 - (1) Install the tracer wire directly on top of the buried pipe, but outside the polyethylene encasement as applicable, prior to placing backfill. Tape wire to the pipe or polyethylene encasement with polyethylene tape at a minimum spacing of 10 feet. Do not connect tracer wire to or come into contact with new pipe or other existing conductive pipes.
 - (2) Perform tracer wire installation in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal, and without distortion of signal caused by multiple wires being installed in close proximity to one another.
 - (3) Install the wire contiguously except at test stations, valve boxes, and where splicing is permitted as specified herein. Complete splices per the manufacturer's recommendations and make watertight. Do not loop or coil wire.
 - (4) Install mainline dead-ends to go to ground using an approved waterproof connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire. Bury anode on the opposite side of the pipeline at the furthest most point. Connect the anode wire in the tracer box to the tracer wire utilizing the connection point in the tracer box.
 - (5) Where it is necessary to join the tracer wire below ground, join the wire in a permanent bond (braising, cad welding, or equivalent) and insulate and render watertight the joined area in order to prevent corrosion. Approved connectors may also be used per the manufacturer's recommendations.

- (6) At every valve box, extend the wires (one in each direction) upward along the exterior of the valve box for connection of locating equipment and tape to the valve box approximately 12 inches below grade with polyethylene tape. Provide adequate slack in the wire leads both above and below the tape to reduce breakage from pulling or settlement. Penetrate the valve box with each wire through a drilled hole fitted with a rubber grommet approximately 6 inches below grade. If directed by the RESIDENT PROJECT REPRESENTATIVE, loop the tracer wire into the valve box to maintain continuity of the wire through the valve box installation. Provide wires with at least 3 feet of extra slack on each tracer wire (total of 6 feet extra wire when looped). Neatly coil the extra wire inside the valve box within easy reach. Do not allow wires to become twisted together.
 - (7) Provide maximum spacing between accessible test points of 1,250 feet or as recommended by the manufacturer, whichever is less. Where spacing between valve boxes exceeds 1,250 feet, terminate tracer wire at a separate tracer box.
 - (8) Lay tracer wire continuously, bypassing around the outside of manholes, vaults, and structure on the north or east side.
 - (9) Properly ground tracer wire per manufacturer's recommendations. Achieve grounding of tracer wire by use of a drive-in magnesium grounding anode rod with a minimum of 20 feet of #14 HDPE copper clad wire connected to anode (minimum 1.0 pound) specifically manufactured for this purpose, and buried at the same elevation as the pipe.
 - (10) Test continuity of wires upon completion of backfill. Replace any wire that fails the continuity test.
- b. For pipe installed via jacking or HDD:
- (1) Either wrap wire around the pipe or tape wire with polyethylene tape to the pipe at a minimum spacing of 10 feet before installation.
 - (2) Install wire contiguously between drill or bore entry and exit with no splices. Install a tracer box at each end.
 - (3) Regardless of the piping material, affix a minimum of 3 tracer wires to the pipe and install simultaneously with pullback of the pipe (HDD) or jacking of the pipe (casing installations).

- (4) Test continuity of wires upon completion of HDD pipe pullback (or upon sealing the casing ends for casing installations). If wires fail the continuity test, the directional drill or casing installation will be rejected.

C. Tracer Boxes:

1. Unless otherwise indicated or directed by the RESIDENT PROJECT REPRESENTATIVE, install tracer boxes at every dead-end, at the beginning and end of every Contract, at both ends of pipe installed by jacking and HDD, and at other locations as necessary to provide access to tracer wire at intervals not to exceed 1,250 feet or as recommended by the manufacturer, whichever is less.
2. Install tracer wire boxes flush with grade in non-traffic areas unless otherwise noted.
3. Connect wires to the terminals and provide with at least 3 feet of extra slack on each tracer wire at each box. Do not allow wires to become twisted together.

D. EMS Markers:

1. Install full range EMS markers at the following locations:
 - a. Valves
 - b. Vaults
 - c. Blow-off assembly risers
 - d. Casing ends
 - e. Directional drilled ends
 - f. Cathodic protection test stations
 - g. Tracer boxes
2. Bury EMS markers within 7 feet of final grade. Place markers flat and level at 6 inches above metal pipe or tubing and no closer than 6 inches from new or existing pipe, valve box, casing, anode, wire, cable, or other utility and facility.
3. Cover EMS markers with 6 inches of firm soil prior to deployment of mechanical compaction equipment to prevent damage to marker.
4. Place EMS markers of the same frequency at least 6 feet apart to ensure maximum radiated signal and distinction between points of interest.

3.2 FIELD QUALITY CONTROL

A. Tracer Wire Testing:

1. Locate new trace wire installations using typical low frequency (512Hz) line tracing equipment and have it witnessed by the RESIDENT PROJECT REPRESENTATIVE, prior to acceptance of ownership. Provide testing as follows.
 - a. Use a standard 5 watt generator to provide an AC current on the wire.
 - b. Initially restrict the frequency of the signal from the generator to 33 kHz or less.
 - c. Use a standard handheld detector to trace the signal.
2. The tracer wire will be deemed to pass the test if:
 - a. The tracer wire is accessible at access points.
 - b. The tracer wire can be traced from access point to access point.
 - c. Widely-spaced access points can be traced out in the worst case from each “end” to a common meeting point between them.
 - d. Depth readings are consistent and accurate to within a 15:1 depth to diameter ratio.
3. Perform verification upon completion of rough grading and again prior to final acceptance.
4. Continuity testing in lieu of actual line tracing will not be accepted.

B. EMS Markers:

1. Prior to final pavement restoration, seeding, sodding, or substantial completion, whichever comes first, demonstrate to RESIDENT PROJECT REPRESENTATIVE that EMS markers are installed as required and are working properly. Replace missing or non-functioning EMS markers prior to final surface restoration or substantial completion at no additional cost to the OWNER.

END OF SECTION

SECTION 40 05 01

SUPPORTS AND ANCHORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing hanging and supporting devices shown, specified, or required for pipelines, apparatus, and equipment other than electrical equipment.
- B. Comply with the "Use of American Iron and Steel (UAIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specification Section 00 45 49.

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation
 - 2. MSS SP-69 - Pipe Hangers and Supports - Selection and Application
 - 3. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices
 - 4. MSS SP-90 - Guidelines on Terminology for Pipe Hangers and Supports

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Shop Drawings, Product Data, and Information:
 - 1. The quantity, type, design and location of supports, hangers and anchors required.
- C. Quality Control:
 - 1. A certificate signed and sealed by a Licensed Professional Engineer experienced in Structural Engineering and registered in the State of

Wisconsin, that certifies that the Licensed Professional Engineer has evaluated and approved the CONTRACTOR's supports and anchors as detailed on the submittal drawings and has prepared complete design calculations confirming the adequacy of supports, hangers, anchors and expansion compensating devices used. Provide a separate certificate for each piping system before starting the installation.

1.4 SYSTEM DESCRIPTION

- A. General: System includes supporting devices adequate to maintain the pipelines, apparatus, and equipment in proper position and alignment under operating and testing conditions with due allowance for expansion and contraction.
- B. Design Requirements: Design supporting devices in accordance with the best practice and provide supporting devices that are not unnecessarily heavy. Design supporting devices to accommodate loads imposed during leakage tests for the test pressures specified. Base the required strength of supporting devices on the combined weight of the piping and connected equipment, the weight of the denser of the fluids used in operations or testing, and the weight of insulation where applicable. Install supports with a working safety factor of not less than 5.
- C. Make hangers and supports of standard design where possible and best suited for the service required. Include proper pipe protection saddles for hangers and supports on pipes which are covered with insulation. Where required, make supports screw adjustable after installation unless approved otherwise.
- D. Interference: Design supporting devices so as to minimize interference with access and movement. Eliminate the potential for injuries due to protruding supporting devices.
- E. Sizing: Provide base piping support, hanger rod size, brackets and spacing meeting the requirements of MSS SP-58, SP-69, SP-89 and SP-90 except as modified herein.
 - 1. Modify hangers for plastic pipes to increase the bearing area by inserting a protective sleeve of medium-gauge aluminum sheet metal between the pipe and the hanger.
 - a. Align hangers such that no sharp edges come in contact with the pipe.
 - b. Provide a thermoplastic pad between plastic pipe and any concrete or masonry surface.
 - c. Use supports for vertical lines of a type which do not exert a compressive strain on the pipe. Riser-type clamps that squeeze the pipe will not be permitted.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products and materials as specified in Division 1.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted.

- 1. Pipe hangers and supports

- a. Grinnell Corporation, Cranston, RI
- b. Globe Pipe Hanger Products, Inc., Cleveland, OH
- c. Pipeline Products, Inc., San Marcos, CA

2.2 MATERIALS

- A. Provide structural and miscellaneous hangers, supports, anchors, and similar devices of Type 304 stainless steel.
- B. Support overhead hangers using threaded rods properly fastened in place by suitable screws, clamps, inserts, or bolts, or by welding. Subject hangers to tensile loading only. Where lateral or axial movement may occur, provide suitable linkage to permit sway. Provide bolts and nuts of Type 304L stainless steel. Coat nuts with Xylan or FluoroKote #1 (corrosion resistant).
- C. Suspended Piping: Support suspended piping by adjustable ring or clevis hangers and threaded rods from heavy duty concrete inserts or other fastening devices, except as otherwise specified or noted.
- D. Brackets: Make brackets of welded 304 stainless steel and designed for the following load classifications.

<u>Load Classification</u>	<u>Maximum Load per Bracket</u>
Light	750 pounds
Medium	1,500 pounds
Heavy	3,000 pounds

1. When medium or heavy brackets are bolted to vertical surfaces, furnish and install backplates of adequate size and thickness to distribute the load against the vertical surfaces.
 2. When the use of backplates is not practicable, fasten the brackets to the vertical surfaces in such a manner that the safe bearing strength of the vertical surfaces will not be exceeded.
- E. Chairs and Pipe Rolls: Use cast-iron pipe rolls or chairs. Provide pipe rolls with threaded nuts or with sockets to take threaded rods.
- F. Saddle Stands: Use adjustable saddle stands.
1. Provide each stand with a length of steel pipe fitted at the base with standard threaded cast-iron flange or steel base plate and at the top with an adjustable saddle or roll. Bolt the base flange or plate to the floor, foundation or concrete base.
 2. Use stanchions of construction similar to the saddle stand, except fit them at the top with cast-iron pipe saddle supports or with pipe stanchion saddles with yokes and nuts.
- G. Expansion: Connect, support and guide piping to permit and control pipe expansion and contraction and to accommodate building expansion, contraction and settling without damage to the piping or support system.
1. Furnish and install anchors when specified, shown, or required for holding the pipelines and equipment in position or alignment. Design anchors for rigid fastening to the structures, either directly or through brackets.
 2. Provide cast-iron chair type anchors for piping with steel straps, except where anchors form an integral part of pipe fittings or where an anchor of special design is required.
 3. Inserts: Provide concrete inserts.
 - a. Design inserts to permit the rods to be adjusted horizontally in one plane and to lock the rod nut or head automatically.
 - b. Recess inserts near the upper flange to receive reinforcing rods.
 - c. Design inserts so that they may be held in position during concrete placing operations. Design inserts to carry safely the maximum load that can be imposed by the rod which they engage.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install hanger and supports in accordance with the manufacturer's recommendations and approved shop drawings and as specified in Division 1.

3.2 GALVANIZING AND PAINTING

- A. Do not galvanize, paint, or coat stainless steel hangers, supports, anchors, and similar devices, except as specified otherwise.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 40 05 20

VALVES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for furnishing and installing valves and operators.
 - 1. Provide valve operators complete, including a suitable enclosure, with appurtenances necessary for the operator to perform its intended function. Such appurtenances include, but are not limited to, anchor bolts and other mounting hardware, gauges, miscellaneous valves, local indicators, operating nuts, direct buried valve boxes and other such items.
 - 2. Provide valves, joints, actuators, operators, and other appurtenances as specified or as shown.
- B. Comply with the "Use of American Iron and Steel (UAIS)" requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, and described in Specification Section 00 45 49.
- C. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 01 45 50 - Leakage Test
 - 2. Section 33 05 50 - Laying and Jointing Buried Pipelines
 - 3. Section 33 05 55 - Buried Ductile Iron Pipe and Fittings

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250
 - 2. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - 3. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes
 - 4. ASTM A536 - Standard Specification for Ductile Iron Castings

- | | | | |
|-----|------------|---|---|
| 5. | ASTM A564 | - | Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes |
| 6. | ASTM D2000 | - | Standard Classification for Rubber Products in Automotive Applications |
| 7. | AWWA C504 | - | Rubber-Seated Butterfly Valves |
| 8. | AWWA C512 | - | Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service |
| 9. | AWWA C515 | - | Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service |
| 10. | AWWA C550 | - | Protective Interior Coating for Valves and Hydrants |
| 11. | AWWA C800 | - | Underground Service Line Valves and Fittings |
| 12. | AWWA M51 | - | Air Valves: Air-Release, Air/Vacuum, and Combination Air Valves |

1.3 SUBMITTALS

- A. General: Furnish submittals, including the following, as specified in Division 1.
- B. Product Data and Information:
 - 1. Product specifications of valves, valve operators, and appurtenances.
- C. Shop Drawings:
 - 1. Complete detailed and working drawings of valves, valve operators and appurtenances, including arrangement and erection drawings of operators and operating characteristics. Identify the valve number or name as specified in this Section on each drawing.
- D. Quality Control:
 - 1. Certificates of compliance for valves attesting that the items are in compliance with the Contract Documents, referenced standards, including proof-of-design testing, and “American Iron and Steel (AIS)” requirements.
 - 2. Manufacturer’s certified performance and material records.

E. Operation and Maintenance Manuals:

1. Operation and maintenance manuals for the valves and operators.

1.4 QUALITY ASSURANCE

- A. Furnish valves of the same type from the same manufacturer. Provide parts that are interchangeable for valves of the same type and size.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle products as specified in Division 1 and as follows. Protect against damage and exposure from the elements. Store materials off the ground for protection against oxidation caused by ground contact.
- B. Storage and Erection: Pack and store valves in satisfactory operating condition. Carefully erect valves in their respective positions, free from distortion and strain.

1.6 INSPECTION

- A. Inspect valves, operators and appurtenances for damage and cleanliness prior to installation. Do not use any material damaged or contaminated in handling on the job unless it is repaired, re-cleaned, or replaced as approved.

PART 2 PRODUCT

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Manufacturers of equivalent products may be submitted unless specified otherwise.
1. Gate Valves: Equivalent products may not be submitted.
 - a. AMERICAN Flow Control
 - b. Clow Valve Company
 - c. Kennedy Valve Company
 - d. Mueller Water Products, Inc.
 - e. United States Pipe and Foundry
 2. Butterfly Valves: Equivalent products may not be submitted.
 - a. DeZURIK, Inc.
 - b. Kennedy Valve Company
 - c. M&H Valve Company
 - d. Mueller Water Products, Inc.
 - e. Val-Matic Valve & Mfg.

3. Corporation Stops:
 - a. A.Y. McDonald Mfg. Co.
 - b. Ford Meter Box Company, Inc.
 - c. Mueller Water Products, Inc.
4. Air Valves:
 - a. A.R.I. Flow Control Accessories Ltd.
 - b. Cla-Val
 - c. Crispin Valves
 - d. DeZURIK, Inc./APCO
 - e. Val-Matic
5. Valve Box and Cover:
 - a. Tyler Union, Series 6860, size “DD” with #6 base

2.2 MATERIALS

A. General:

1. Fabricate valves and operators of materials resistant to corrosion for the required service as recommended by the manufacturer and as specified herein.
2. Fabricate valves with a working pressure rating meeting or exceeding that of the pipeline as shown, exceeding that of the pipeline test pressure in which the valve is installed in accordance with Section 33 05 50, or as specified, whichever is greater.
3. Provide interior passages of valves that are free of obstructions or stops.

B. Valve Joints

1. Fabricate valves 2 inches in diameter and smaller of the threaded end type.
2. Fabricate valves larger than 2 inches in diameter as specified or shown.
 - a. For metallic flanged joints, provide flanges that are faced accurately at right angles to the axis of the casting. Face and drill flanges and shop coat with a rust-preventive compound before shipment.
 - b. For flanged joints, provide flanges whose dimensions and drillings meet the requirements of ASME B16.1, 125 pounds as a minimum. Provide flanges with a working pressure rating meeting or exceeding that of the pipe as shown, exceeding that of the pipeline test pressure

in which the valve is installed, or as specified, whichever is greater. Furnish special drillings where required. For valves having flanges that do not conform to the thickness requirements of ASME B16.1, test each valve in accordance with the hydrostatic shell test pressure requirements of ASME B16.1.

- C. Operating Force: Fabricate valves to limit the maximum force required to operate manual valves to 40 pounds.
- D. Handwheel: Mark each valve handwheel with an arrow and the word OPEN.

2.3 GATE VALVES

A. General:

1. Provide resilient-seated gate valves. Manufacture valves and accessories, including operators, to meet the requirements of AWWA C515, except as otherwise specified.
2. Provide valves that are counterclockwise to open marked with a directional arrow and the word OPEN.

- B. Materials: Unless otherwise shown or specified, provide gate valves matching the adjoining pipe size shown with joints as shown or specified in Section 33 05 55 meeting the requirements of AWWA C515 and with materials as specified below:

Item	Standard	Material Description
Type	AWWA C515	Resilient-Seated
Body	ASTM A126, Class B ASTM A536	Cast Iron Ductile Iron
Stem	-	Non-Rising, Stainless Steel
Stem O-Ring	ASTM D2000	Buna-N
Bonnet	ASTM A536	Ductile Iron
Bonnet Bolts and Nuts	-	Type 304L or 316 Stainless Steel
Encapsulated Disc	ASTM A536 and ASTM D2000	Ductile Iron Encapsulated in EPDM Rubber
Operating Nut	-	Type 316 Stainless Steel

Item	Standard	Material Description
Coating	AWWA C550	Fusion Bonded Epoxy

- C. Actuator: Provide manual actuators of the same manufacturer or brand of the valve with 2-inch standard AWWA operating nuts meeting the requirements of AWWA C515 and in accordance with the pressure class of the valve.

2.4 BUTTERFLY VALVES

A. General:

1. Provide butterfly valves of the rubber-seated, tight-closing, short-body type. Manufacture valves and accessories, including operators, to meet the requirements of AWWA C504, except as otherwise specified. Wafer body type valves without lugs are not acceptable.
2. Provide valves that are counterclockwise to open marked with a directional arrow and the word OPEN.

- B. Materials: Unless otherwise shown or specified, provide valves matching the adjoining pipe size shown with joints as shown or specified in Section 33 05 55 meeting the requirements of AWWA C504 and with materials as specified below:

Item	Standard	Material Description
Type	AWWA C504	Rubber-Seated
Body	ASTM A126, Class B ASTM A536	Cast Iron Ductile Iron
Shaft	ASTM A276 or A564	Stainless Steel
Disc	ASTM A536	Ductile Iron
Seat	-	Buna-N
Mating Seat Surface	ASTM A276	Stainless Steel
Bearings	-	Self-Lubricating
Actuator Housing	ASTM A126, Class B ASTM A536	Cast Iron Ductile Iron
Hardware	-	Stainless Steel

Item	Standard	Material Description
Operating Nut	-	Type 316 Stainless Steel
Coating	AWWA C550	Fusion Bonded Epoxy

- C. Actuators: Provide traveling nut manual actuators of the same manufacturer or brand of the valve with 2-inch standard AWWA operating nuts meeting the requirements of AWWA C504 and in accordance with the pressure class of the valve.

2.5 CORPORATION STOPS

- A. Provide brass corporation stops as shown and meeting the requirements of AWWA C800. Provide brass corporation stops with AWWA/CC threaded inlet compatible with the connection pipe, valve, or appurtenance shown.

2.6 AIR VALVES

A. General:

1. Provide wastewater-type air valves as shown meeting the requirements of AWWA M51 and AWWA C512.
2. Provide vent piping for the exhaust and intake of air as shown.
3. Provide an adequate base for strong support and stability.

B. Materials:

1. Provide valve materials, joints, and shutoff valve as specified below. The use of thermoplastic components is not acceptable.
 - a. Valve Type: Combination Air Valve
 - b. Valve Bodies:

Cast Iron	ASTM A126, Grade B
Ductile Iron	ASTM A536, Grade 65-45-12
 - c. Joints: Flanged
 - d. Seat: Buna-N
 - e. Other Internal Hardware: Type 316 Stainless Steel

- f. Shutoff Valve Butterfly Valve
 Leading to Air
 Valve from
 Pipeline:

2. Provide corrosion resistant coating for the application as recommended by the manufacturer and in accordance with AWWA C512.
3. Provide seat and orifice button with durometer as recommended by the manufacturer for the maximum normal operating pressures as shown.
4. Provide a shutoff valve between the air/vacuum valve and the air release valve as shown.
5. Provide isolation valve with air valve as recommended by the manufacturer.

2.7 VALVE BOXES

- A. Provide direct buried valves with adjustable type valve boxes to finished grade as shown. Equip each direct buried valve with a street duty rated cast iron three-piece, screw type, 5-1/4" stem valve box. Provide a cover with a stay-put design, with embossed cover as shown. Provide a screw-type riser or long throat riser to accommodate final lift of asphalt if adjustable box cannot be adjusted to match final grade. Use of inserts for matching final grade is not acceptable.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Install valves, valve operators, and appurtenances in accordance with the manufacturer's recommendations and approved shop drawings and as specified in Division 1. Install valves with sufficient clearance for proper operation of external mechanisms, and with sufficient clearance to dismantle the valve for in-place maintenance.
- B. Valve Boxes: Install each valve box directly over the valve it serves, with the top of the box flush with finished grade. Set valve boxes plumb. After each valve box is placed, backfill and thoroughly tamp around valve box.
- C. Air Valves: Install air valves in accordance with the manufacturer's recommendations and with a shutoff valve connection for isolation as shown or specified. Install air valves so that the direction of air flow through the valve is in accordance with the manufacturer's recommendation and required for the service.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Furnish the services of a qualified representative of each manufacturer to provide instruction on the proper installation of the equipment, inspect the completed installation, make any necessary adjustments, participate in the startup of the equipment, participate in the field testing of the equipment, and place the equipment in trouble-free operation, as specified in Division 1.
- B. Tests: After installation of the valves and appurtenances, subject the units to a hydrostatic leakage test meeting the requirements of Section 01 45 50. Repair leaks in accordance with Section 01 45 50 regardless of how the leakage is identified.

3.3 OPERATION DEMONSTRATION

- A. Manufacturer's Field Services: Furnish the services of a qualified representative of each manufacturer to demonstrate the proper operation and instruct OWNER personnel in the equipment's operation and maintenance, as specified in Division 1.

3.4 SCHEDULE

- A. Abbreviations used in the schedule are as follows:
 - 1. Joints:
 - a. F Flanged
 - b. RMJ Restrained Mechanical Joint
 - c. Sc Screwed
 - 2. Operators:
 - a. H Handwheel
 - b. N Nut
- B. Services of each facility are as follows:
 - 1. Return Flow Pipeline Wastewater, Treated Effluent

VALVE SCHEDULE					
Facility	Valve Type	Size Inches	Joint Type	Operator Type	Notes
<u>RETURN FLOW PIPELINE</u>					
Blow-Off Assembly	Gate	8	RMJ	N	-
Isolation Valve					
Isolation Valve	Butterfly	30	F, RMJ	N	-
Isolation Valve	Corporation Stop	1/2	Sc	-	1
Air Valve Assembly					
Air Valve	Combination, Dual Body	4, 6	F	-	2
Isolation Valve	Butterfly	4, 6	F	H	-

Notes:

1. Provide corporation stops in isolation valve vaults as shown.
2. Provide air release valve inlet size of 2 inches.

END OF SECTION

SECTION 40 80 50

PROCESS CONTROL SYSTEM COMMISSIONING

PART 1 GENERAL

1.1 SUMMARY

- A. Provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install all equipment and coordinate all activities necessary to perform check-out and start-up of the equipment installed as part of the GWA Project, Contract Package 5.
- B. Retain the services of a SYSTEM INTEGRATOR, with substantial documented experience, to supervise and perform check-out and start-up of all Process Control System components. Provide the services of an authorized manufacturer's representative who is thoroughly knowledgeable about the installation, operation, and maintenance of the equipment, to check the equipment installation and place the equipment in operation.
- C. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 40 90 00 - Process Control System General Requirements
 - 3. Section 40 91 00 - Process Control System Instruments
 - 4. Section 40 94 13 - Process Control Systems Computer and Network Hardware
 - 5. Section 40 94 43 - Programmable Logic Controller Systems
 - 6. Section 40 95 13 - Process Control System Panel Enclosure and Equipment
 - 7. Section 40 98 50 - Process Control System Factory Acceptance Testing

1.2 SUBMITTALS

- A. General: Furnish all submittals as specified herein, and as specified in Section 01 33 00 - Submittals.
- B. Action Submittals:
 - 1. Prior to beginning commissioning activities, submit the following for OWNER approval, meeting the sequence and schedule established by the CONTRACTOR for facilities impacted by the Contract, as well as overall commission. Submit to meet requirements per process area and for facility wide commissioning:
 - a. Test Plan

- b. Test Forms
- c. Test Schedule
- d. Testing Tools
- e. Test results
- f. Test Logs
- g. Loop Check List
- h. Point to Point Wiring Diagrams
- i. Preliminary Testing Results
- j. Approved O&M Manual List
- k. Certification that the Test Engineer has reviewed all data and the system and certifies that it is ready for operation

2. Forms

- a. Submit sample test forms and test logs for review

1.3 SYSTEM CHECKOUT AND START-UP

A. SYSTEM INTEGRATOR: as witnessed by the OWNER, as applicable, perform the following:

- 1. Check and approve the installation of all Process Control System components and all cable and wiring connections between the various system components.
- 2. Conduct a complete system checkout and adjustment, including checking each components functions, and testing of final process control system instrument, device, computer, and network functions. Promptly correct all problems encountered to prevent any delays in start-up of the process control system network.
- 3. Furnish all test equipment necessary to perform the testing during system checkout and start-up.
- 4. Assume responsibility for initial operation of the process control system and make any required corrections, adjustment, or replacements necessary to the system to perform the intended functions.

5. Furnish RESIDENT PROJECT REPRESENTATIVE an installation inspection report, signed by authorized representatives of CONTRACTOR, SYSTEM INTEGRATOR, and SUPPLIER, certifying that all equipment has been installed correctly and is operating properly.

1.4 INTEGRATED SYSTEM FIELD TEST

- A. SYSTEM INTEGRATOR: as witnessed by the OWNER, as applicable, perform a complete system test to verify that all Process Control System (PCS) instrumentation and controls equipment, network hardware, and software is operating properly as a fully integrated system, and that the intended network functions are fully implemented and operational.
 1. Complete integrated test after all process areas are demonstrated as operational and tested individually, and after individual facilities are tested and proven operational.
 2. Correct any defects or problems found during the test, and then retest to demonstrate proper operation.
- B. Refer to Part 2 of this specification for detailed Integrated System Field Test (SAT & Start-up) requirements.

1.5 30-DAY TEST

- A. The 30-Day Test is a period of time during which the control system is utilized by the OWNER in day-to-day operations. The purpose of the process control system 30-Day test is to test the control system stability and completeness over time. This test occurs in conjunction with all other systems included in the project. The intent of the test is for the system to operate without modification or repairs.
- B. CONTRACTOR: start the 30-Day Test upon written approval from the OWNER/RESIDENT PROJECT REPRESENTATIVE.
- C. Continue 30-Day Test until a time frame has been achieved wherein the system (both hardware and software) availability meets or exceeds 99.7 percent for 30 consecutive days and no system failures have occurred which result in starting the 30-Day Test over. During the 30-Day Test, the system is available to operating personnel for use in normal operation.
- D. For the purpose of the 30-Day Test, the system is defined as all new control system work installed under this Contract, as well as any modifications made to the existing control system.
- E. Terminate the 30-Day Test if one or more of the following occur. Following correction of the problem, begin a new 30 consecutive day 30-Day Test.

1. Failure to repair a hardware or software problem, causing one or more processes halt execution, within 24 consecutive hours from the time of notification failure(s).
 2. Recurrent hardware or software problems: If the same type of problem occurs three times or more.
 3. Programming or configuration corrections reset the 30-Day clock.
- F. The following conditions constitute a system failure in determining the system availability based on the equation specified in Paragraph 1.5.G, below:
1. Loss of communications between devices on the process control system network.
 2. Failure of one or more network devices
 3. Failures of any device impacting two or more process control system components simultaneously.
 4. Failure of Power Supply: Where redundant power supplies are provided, failure of one power supply will not constitute a system failure provided the backup power supply operates properly and maintains power supply. Failure of the backup supply to operate properly and maintain supply power constitute a system failure.
 5. The system is considered down if the system cannot generate the periodic reports, alarm log, or event log. The report and logs need not appear on the printer originally selected for the report.
 6. Downtime caused by primary utility power failure will not count as downtime.
 7. Loss of any microprocessor is considered downtime.
 8. Loss of more than 5 percent of the total inputs or outputs per processor is considered downtime.
 9. The accuracy and precision of all of the analog inputs and outputs must be within the limits specified, or the system is considered down.
 10. The time between notifying the CONTRACTOR of a system failure and the time it has been corrected and back on line is considered downtime.
 11. Shutdown of the critical systems from a software fault is considered downtime.

- G. The system availability is calculated based on the following equation:

$$A = \frac{TTO}{TTO + TTR} \times 100 \text{ percent}$$

where,

A = system availability in percent

TTO = total time in operation

TTR = total time to repair

- H. Time to repair is the period between the time that CONTRACTOR is notified of a system failure and the time that the system has been restored to proper operation in terms of hours with an allowance for the following dead times which is not counted as part of the time to repair period.

1. Actual travel time for service personnel to get to the Site up to four hours per incident from the time CONTRACTOR is notified of a system failure.
2. Time for receipt of replacement parts to the Site once identified up to 8 hours per incident. Work done on the system while waiting for delivery of replacement parts does not stop the failure clock.
3. Dead time is not counted as part of the system available period. The dead time is logged and the duration of the 30-Day Test is extended for an amount of time equal to the total dead time. Dead time is to be totalized.

- I. CONTRACTOR: furnish all parts and maintenance materials required to repair the system prior to completion of the 30-Day Test at no additional cost to OWNER. If parts are obtained from the Contract spare parts inventory, they are to be immediately replaced.

1.6 SPARE PARTS

Not Used

PART 2 SITE ACCEPTANCE TESTING

2.1 GENERAL

- A. The Process Control System (PCS) Site Acceptance Test (SAT) is focused on verifying that all instrumentation, equipment, PLC/OIT/HMI, and controller hardware and software are working properly and that all software configurations match the requirements identified in the detailed process narratives. Successful completion of the SAT is considered to be a critical project milestone.

- B. CONTRACTOR: test the software, witnessed by OWNER / ENGINEER / RESIDENT PROJECT REPRESENTATIVE, under all possible process conditions in order to demonstrate the robustness of the software.
- C. The SAT consists of testing using the actual field inputs/outputs once all field equipment has been installed and successfully tested.
- D. Carry out SAT testing for all PLC/OIT/HMI and controller software including packaged and vendor supplied products as a whole system.

2.2 PREREQUISITES

- A. Complete equipment start-ups with manufacturer representatives, including all mechanical equipment required to fully test the operation of the software. Complete process area start-ups prior to overall SAT.
- B. Install, calibrate, and test all required instrumentation prior to starting SAT.
- C. Install and test all required network equipment prior to starting the first facility SAT.
- D. Submit the SAT & Start-Up Test plan for approval by the OWNER / ENGINEER / RESIDENT PROJECT REPRESENTATIVE no later than four (4) weeks in advance of the SAT.
- E. Wire up, test and sign off 100% all system panel I/O prior to commencing SAT unless otherwise approved by OWNER / ENGINEER / RESIDENT PROJECT REPRESENTATIVE. Submit a request to defer I/O testing until after the SAT for review and approval at the same time when the SAT & Start Up test plan is submitted for review and I/O is not available. Identify the reason for deferring I/O testing in the request along with a proposed date for when to test the I/O.

2.3 START-UP TEAM

- A. The Start-Up Team consists of individuals from the OWNER, ENGINEER, RESIDENT PROJECT REPRESENTATIVE, CONTRACTOR, SYSTEM INTEGRATOR, and Equipment Manufacturers.
- B. Start-Up Team: review the testing plan, SAT, & Start-Up Plan and revise, if necessary, at a pre-SAT & Start-Up meeting to be scheduled no later than six (6) weeks in advance of the proposed SAT period.
- C. Furnish details for the SAT & Start-Up Plan to clearly identify the proposed test procedure for the equipment and software.
- D. The SAT testing is witnessed by the Start-Up Team.

- E. Identify members of the Start-Up Team at the pre-SAT & Start-Up meeting. These team members will be involved throughout the process and can be changed only with the approval of the RESIDENT PROJECT REPRESENTATIVE.

2.4 PURPOSE AND SCOPE

- A. The goal of software testing is to verify that the system released for use by the Facility's Staffs meets the contract requirements, and is error-free. Ensure that software installed or modified under the project does not adversely affect the operation of other systems currently in operation at existing OWNER facilities. All functionality that is currently available within the system must remain available at the completion of the testing.
- B. Test all software installed as part of the project to confirm that the software developed, tested, and installed under the project conforms to the approved process control narratives.
- C. Ensure all software meets the requirements of the project specifications including all operational control, monitoring, and alarming.
- D. Provide testing that demonstrates all software developed works throughout OWNER SCADA workstations. Conduct all system-wide testing concurrently with the local testing to confirm operation throughout the system.

2.5 DEFINITIONS

- A. Software testing: defined as the execution of a program to find its faults, and not just a process to verify its correctness.
- B. Other definitions are:
 - 1. Verification: The process of proving the program's correctness.
 - 2. Validation: An attempt to find errors by executing a program in the controllers, Control nodes, and Monitoring nodes.
 - 3. Debugging: Diagnosing the precise nature of a known error then correcting it. Debugging is a "fix" activity, not strictly a testing activity.
 - 4. Errors: Human mistakes; errors in design definition or interpretation of the design by the programmer.
 - 5. Defects: Improper program conditions that are generally the result of an error. Not all errors produce defects (as with incorrect program comments, for example).
 - 6. Bugs: A fault that is a program defect found when the program is being

tested or is in operational use. Bugs result from defects, but all defects do not necessarily produce bugs.

2.6 OBJECTIVES

- A. The following identifies the overall objectives of the PCS Site Acceptance Test:
 - 1. Confirm and document that the PLC I/O matches the panel shop drawings in terms of input/output configuration, tagging, and function.
 - 2. Confirm and document that the individual device logic operates correctly and safely, as described in the Contract Drawings.
 - 3. Confirm and document that the control logic operates correctly and safely, as reviewed at the FAT and also described in the Contract Drawings.

2.7 APPROACH

- A. As part of the testing process regression, incorporate testing into all test plans to demonstrate that any changes made to the software do not impact other areas of the logic. Ensure that corrections/modifications have not adversely affected the previously tested (and debugged) systems and system components.
- B. Testing is to be both progressive and regressive.
 - 1. Progressive testing introduces and tests new functions and uncovers problems in the newly added or modified modules and in their interfaces.
 - 2. Regressive testing concerns the effects of newly introduced changes or system components on all previously integrated (tested) code.
- C. Goal of software testing: to ensure that the system released for use by users meets the contract requirements, is error-free, and does not adversely affect other systems.

2.8 TEST SUCCESS CRITERIA

- A. Test success is based on the number of defects and the defect severity levels encountered during the testing period. The OWNER/ENGINEER/RESIDENT PROJECT REPRESENTATIVE at their discretion determines to restart a new SAT.

2.9 COMPLETION CRITERIA

- A. Testing of software is deemed to be complete when all features, functions, and information required in accordance with Section 40 90 00 - Process Control System General Requirements, drawings, and the complete functionality as

described in the Contract Documents has been verified as present and functioning, and documented as accurate within the anticipated operating range for the process being monitored and controlled.

2.10 PARTICIPANT AND RESPONSIBILITIES

A. SAT & Start-Up Test Planner (CONTRACTOR / SYSTEM INTEGRATOR / Equipment Mfr.):

1. Develops the complete SAT & Start-Up test plan
2. Develops the schedule
3. Coordinates all meetings identified in the contract documents to develop and implement the test plan
4. Coordinates the involvement of all team members and equipment manufacturers required to be present during testing
5. Develops/compiles the test data
6. Oversees the test planning and test plan execution of the process control system
7. Obtains approval for test plan and schedule from ENGINEER/RESIDENT PROJECT REPRESENTATIVE.

B. OWNER/ENGINEER/RESIDENT PROJECT REPRESENTATIVE:

1. Reviews and approves test plan
2. Documents test results and classifies defect severity
3. Identifies system “design” defects (where the design does not match the specification) and coding defects (where the system does not behave as specified)
4. Reviews test results
5. Assigns Level 1, 2, and 3 faults. Logs action required and taken in the Software Action Log
6. Assigns Level 4, 5, and 6 faults. Logs action required and taken in the Software Action Log
7. Maintains Software Action Log

8. Maintains Deficiency Log related to other trades: electrical, instrumentation, vendor packages, and others
9. Presents Corrections Requests to the OWNER for prioritization
10. Schedules approved corrections request work
11. Maintains Correction Request Log
12. Coordinates with City operations staff to avoid conflicts and minimize impact to operations of construction activities
13. Participates and assists in the acceptance testing
14. Responsible for signing-off on the acceptance testing that the system is fully functional as defined within the detailed process control narrative
15. Oversee the integration of the software into the existing SCADA network

C. SYSTEM INTEGRATOR

1. Responsible for defining the procedure required to complete the SAT & Start-Up tests
2. Responsible for directing the SAT and start-up testing and for providing input to the CONTRACTOR as to which trades are required to complete the tests identified within the test plan
3. Installs and tests all software for functionality as per the detailed process control description
4. Fixes all defects
5. Documents test results and forwards to CONTRACTOR

PART 3 EXECUTION

3.1 GENERAL

- A. Part 3 provides an outline of the work to be carried out by the OWNER/ENGINEER/RESIDENT PROJECT REPRESENTATIVE/ CONTRACTOR/SYSTEM INTEGRATOR/Equipment Mfr. as part of the PCS Site Acceptance Test(s).

3.2 TEST SUB-PHASE

A. The types of software tests are:

1. Individual instruments, equipment, and process units: these sub-phases test/verify that devices and their larger system parts (e.g. process units and duty tables) perform as specified.
2. Intra-system Integration: tests/verifies the interfaces between units and the associated process logic related to multiple units, and facility-wide operating strategies.
3. Function: tests/verifies the functions the program is to perform as set out in the detailed process control narratives.
4. Performance/Operational: tests/verifies the system's performance under a variety of conditions (normal/abnormal) and verifies these results against the detailed process control narratives. Includes testing of the system's configuration, security, backup/recovery, and reliability in the planned network architecture.
5. System Wide Integration: tests/verifies the operation of all control areas from all OITs and HMI operator workstations.

3.3 DEFECT HANDLING

- A. During testing, identify the need for corrections to the system as a result of a test failure or as a result of an incorrectly specified requirement (test did not fail, but the requirement is incorrectly specified).
- B. For test failures, record the defect in the SAT test document. Immediately review and resolve all defects during the SAT period.
- C. Use the following "Fault Severity Index" for handling defects:

Defect Severity Level	Defect Description
1	Fault causes system to crash. System rendered unusable/non-functional.
2	Fault occurs in a critical function. Function is rendered unusable. A critical function is defined as a function that is required to maintain operation of the facility without manual intervention by the operations team.

Defect Severity Level	Defect Description
3	Fault occurs in a critical function. A portion of the function is rendered unusable.
4	Fault occurs in a non-critical function. Function is rendered unusable.
5	Fault occurs in a non-critical function. A portion of the function is rendered unusable.
6	Cosmetic (e.g. typo) and would be unlikely to result in loss of confidence by users.

- D. Testing cut-off points also need to be established in the test plan and reflected in the testing schedule. Correct level 1, Level 2, and Level 3 faults as a first priority. Do not proceed to the next sub-phase until all Level 1, 2, and 3 faults are corrected.
- E. The OWNER / ENGINEER / RESIDENT PROJECT REPRESENTATIVE determines the priority for correcting Level 4, 5, and 6 faults and prioritizes all Correction Requests.
- F. If Correction Requests are required, they will be prepared by the RESIDENT PROJECT REPRESENTATIVE. Possible implications of not proceeding should also be identified. The OWNER will authorize the work to be done under any correction request prior to implementation.
- G. CONTRACTOR: schedule correction request work based on the project priorities.

3.4 SUCCESSFUL COMPLETION

- A. The SAT is deemed successful when the following items have been completed:
 - 1. SAT Test plan has been completed and signed-off
 - 2. All Level 1, 2, and 3 faults identified during the SAT have been corrected and verified for correct operation
 - 3. The completed SAT plan has been reviewed and signed off by the ENGINEER, RESIDENT PROJECT REPRESENTATIVE, CONTRACTOR, and SYSTEM INTEGRATOR.

3.5 FACILITY STARTUP PERIOD

- A. Following successful completion of the SAT testing, the startup period may commence. OWNER, ENGINEER, RESIDENT PROJECT REPRESENTATIVE,

CONTRACTOR, and SYSTEM INTEGRATOR, are to be present during the startup period.

- B. RESIDENT PROJECT REPRESENTATIVE maintains a log of faults/deficiencies encountered during the startup period. The CONTRACTOR/SYSTEM INTEGRATOR is to immediately correct faults/deficiencies at the request of the OWNER, ENGINEER, or RESIDENT PROJECT REPRESENTATIVE. If any Level 1, 2, or 3 fault occurs during the startup period, the test period is restarted from Day 1 after completion of the software modifications and testing by the SYSTEM INTEGRATOR.
- C. Following completion of the startup period, the fault/deficiency log is submitted to the RESIDENT PROJECT REPRESENTATIVE for review. Sign-off by OWNER, ENGINEER, RESIDENT PROJECT REPRESENTATIVE, CONTRACTOR, and SYSTEM INTEGRATOR is required at the completion of the facility startup period.

3.6 TRAINING

Not Used.

3.7 MANUFACTURER'S FIELD SERVICES AND TRAINING

Not Used.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 40 90 00

PROCESS CONTROL SYSTEM GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section 40 90 00 describes the general requirements for furnishing and installing process control system (PCS) including all labor, materials, equipment and incidentals as shown, specified, and required to furnish, install, calibrate, and place in operation a complete system as illustrated on drawings, and as specified in the following sections.
- B. Provide labor, materials, equipment, and services to store, transport, install, calibrate, and make operational the PCS work for the V-RF08 PLC Control Panel as part of Contract Package 5 of the GWA project. The work includes the design shown on the drawings and specifications including instruments, field devices, networks, programming, integration, testing, and commission for all devices provided. Work also includes wiring, raceway, fittings, and connections to link and integrate the individual components into the existing SCADA network.
- C. CONTRACTOR: comply with the American Iron and Steel (AIS) requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, further described in the Bid Form.
- D. Work Areas for This Project Include, But are Not Limited to:
 - 1. V-RF08 Valve Vault Facility
 - 2. Clean Water plant (CWP)/Return Flow Pumping Station (RFPS)
- E. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 40 80 50 - Process Control System Commissioning
 - 3. Section 40 91 00 - Process Control System Instruments
 - 4. Section 40 94 13 - Process Control Systems Computer and Network Hardware
 - 5. Section 40 94 43 - Programmable Logic Controller Systems
 - 6. Section 40 95 13 - Process Control System Panel Enclosure and Equipment
 - 7. Section 40 98 50 - Process Control System Factory Acceptance Testing

1.2 SYSTEM SUPPLIERS

- A. CONTRACTOR: provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish, install, calibrate, test, start-up, and place in satisfactory operation a complete process control system.
- B. CONTRACTOR: Assume responsibility for all elements specified and provided as part of this section and related sections.
- C. SYSTEM INTEGRATOR: provide all programming, integration, testing, start-up, and commissioning services related to V-RF08 PLC control system.
- D. SYSTEM INTEGRATOR: responsible for all details necessary to properly install, adjust, configure, and place in operation the intended system.

1.3 REFERENCES

- A. Regulatory Requirements
 - 1. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes, applicable to construction and installation of electrical wiring, devices, material and equipment.
 - 2. NECA Standards: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation".
 - 3. UL Labels: Provide control panel components, power supplies, relays, etc., which have been listed and labeled by Underwriter's Laboratories.
- B. The purpose of Contract drawings and specifications is to convey information required for complete and functioning systems. Instrument List and Input/Output List, if provided, are for convenience; their accuracy is not guaranteed.
- C. Section 01 42 20 – References.
- D. Codes and Standards referred to in this Section are:
 - 1. IEEE 802.3 10/100/1G Ethernet networks
 - 2. ISA-S5.4 Instrument Loop Diagrams.
 - 3. NFPA 70 National Electrical Code
 - 4. NFPA 79 Electrical Standard for Industrial Machinery
 - 5. UL Underwriter's Laboratory

- 6. NEMA National Electrical Manufacturers Association

1.4 QUALITY ASSURANCE

A. Standard Products

- 1. Use standard hardware and software which is fully developed, tested, and supported as a base for the Work. Provide custom modifications as specified elsewhere. Provide a fully operational, reliable system which meets the functional intent of the Specifications.

B. Software Testing Standards

- 1. Test programs to ensure that the software to be provided is consistent with the design parameters and that no errors occur when the programs are executed, either at machine level (PLC) or operator level (HMI).
- 2. Establish testing standards.

C. Revision Level

- 1. Update hardware and firmware to the manufacturer's latest revision level. Perform updates periodically until final acceptance, as revisions are issued by the manufacturer. Provide hardware and firmware uniform across enterprise system.
- 2. Exceptions will be considered on a case-by-case basis. Exceptions are not allowed without certification that the original equipment manufacturer will continue to support and warranty the hardware.
- 3. Ensure retention of compatibility with all systems before performing any hardware, software, or firmware upgrades.

1.5 ABBREVIATIONS

- A. CWP – Clean Water Plant
- B. HMI – Human Machine Interface.
- C. OIT – Operator Interface Terminal
- D. OWS – Operator Work Station
- E. PCS – Process Control Systems.
- F. PLC – Programmable Logic Controller

- G. RFPS – Return Flow Pumping Station
- H. RTU – Remote Terminal Unit
- I. SCADA – Supervisory Control And Data Acquisition
- J. WWU – Waukesha Water Utilities

1.6 DEFINITIONS

- A. Process Instrumentation and Control Equipment: Instrumentation and control and monitoring components such as field elements, panels, process control systems, and associated electromechanical, electrical, and electronic accessories.
- B. Process Instrumentation and Control System: Materials, equipment, and work required to implement a complete and operating system of instrumentation and control equipment.
- C. PLC: System includes power supply, central processing unit (CPU), communication controller, interconnect cables, and input and output interface.
- D. RTU: Microprocessor-controlled electronic device that interfaces objects in the physical world to a distributed control system or SCADA system by transmitting telemetry data to a master system, and by using messages from the master supervisory system to control connected objects.
- E. SCADA: Computer system that operates as primary operator interface to the entire PLC network, which includes process visualization and control, data collection and storage, alarm management, and process data link to other office productivity software.
- F. OIT: Graphical local operator interface terminal at a PLC enclosure or control panel.
- G. OWS: PC based operator system, including hardware, operating system software, and operator interface HMI system software. This is generally referred to as the SCADA or HMI workstation.

1.7 GENERAL DESCRIPTION OF WORK

- A. Provide all materials and work necessary for complete and fully functional systems.
 - 1. Provide instrumentation and controls components as well as complete system integration. Provide all mounting hardware and supports. Work includes panel mounting and the completion of all wiring terminations within control panels.

2. Integrate new equipment and instrumentation to OWNER's existing SCADA systems for monitoring and control of equipment as shown in the contract drawings. Control strategies for the PLC systems are provided in Section 40 90 50 - Process Control System Description.
3. Configure all I/O points as required by Section 40 90 50 - Process Control System Description.
4. Commission PLC system per the requirements of section 40 80 50 - Process Control System Commissioning.
5. Ensure communication with OWNER's existing SCADA system through both new and existing control network allowing monitoring and control of new equipment.
6. Ensure proper interface between SCADA and PLC systems and equipment provided in this contract.
7. Provide control panels and enclosures as shown on Contract Drawings and as specified in Section 40 95 13 - Process Control System Panel Enclosures and Equipment.
8. Provide necessary training for OWNER to perform all functions necessary to monitor equipment.
9. Work is generally as shown on the drawings and as specified. Programming of each PLC/OIT/HMI is required including communication and messaging with related equipment (drives, packaged systems, generators, power monitors, etc.) Configuration of network equipment, including implementation of network security consistent with GWA requirements is required.
10. Coordinate work with all electrical, mechanical, and structural work provided in this Contract.
11. Install, make final connections, adjust, test, start-up systems per manufacturer's instructions and recommendations.

B. Source Code Ownership

1. Any developed ladder logic (along with source code) is the property of the OWNER.
2. Any developed or modified PLC, HMI, OWS, and OIT applications (along w/ source code) is the property of the OWNER.

3. Document and submit all passwords to OWNER.

1.8 SUBMITTALS

- A. General: Furnish all submittals as specified herein, and as specified in Section 01 33 00 - Submittals.
- B. SYSTEM INTEGRATOR: prior to beginning any work on this Contract, submit a plan for performing programming, site testing, commissioning, and start-up for OWNER approval.
- C. Include the following information in the submittal for this section:
 1. A system hardware overview that provides an overall description of the PCS equipment being added, including a detailed system configuration diagram.
 2. Power and grounding interconnection diagrams. Show the grounding philosophy and implementation. Detail interconnections from the main power source. Show uninterruptible power supplies and power conditioners.
 3. Interconnecting wiring and cabling diagrams. Include maximum distance limitation between panels and equipment. Include cable identification.
 4. Color schedule with color and samples for panels.
- D. Include the following submittal information on each hardware item:
 1. General data and description.
 2. Engineering specifications and data sheets, annotated as necessary to describe specific hardware.
 3. Dimension drawings, including exterior dimensions and clearances required, cable ingress and egress areas, cable routing and terminations.
 4. Equipment weights.
 5. Power and grounding requirements, wiring diagrams, and electrical schematics.
 6. Heat rejections and environmental operating requirements.
 7. Spare parts list, special tools, and test equipment.
 8. Other submittal information as required in individual specification sections.

E. Action Submittals

1. Product Data: Submit manufacturer's official and published product data, specifications, and installation recommendations for each item.
2. Shop Drawings: Submit shop drawings as per Section 01 33 00 - Submittals, and as required below. Include the following information in each submittal:
 - a. Instrument index, including tag number, description, location, and calibrated range for each instrument.
 - b. Individual instrument specification sheet, including manufacturer's name and complete catalog number.
 - c. Panel construction drawings with dimensions, layout, and bill of materials.
 - d. Panel wiring diagrams
 - e. Loop diagrams
 - f. Communication and digital networks diagrams

F. Include connections to Cellular network.

1. Format: Network schematic for each different type of network.
2. Input and Output drawings, containing, but not limited to, the following information:
 - a. Line numbers and instrument tag numbers
 - b. Individual component locations
 - c. Actual equipment wiring terminal designations, point to point wiring, and cable shield terminations
 - d. Wire type, size, and identification number
 - e. Signal types (e.g., 120 VAC, 4-20 mA, pulse frequency, etc.)
 - f. Contact orientations (e.g., normally open, normally closed, etc.)
 - g. Equipment grounding requirements
 - h. Signal boosters, interposing relays, optical isolators, and shunt resistors.

G. Information Submittals

1. Test Reports: Provide all loop field calibration reports.
2. Factory and Field Testing: Provide the following:
 - a. Test Results:
 - (1) Pass/fail status of all digital I/O.
 - (2) Results of analog I/O testing.
 - b. Miscellaneous:
 - (1) Detailed step-by-step in-factory and field test procedure at least 6-weeks in advance of scheduled test date. Include sign-off sheets and punch list forms and description of configurations to be tested.
 - (2) Complete inventory of equipment to be tested including make, model, and serial number. Label each piece of equipment.
 - (3) Preventive maintenance schedule.
 - (4) Repair Report Forms.
 - (5) Spares and Consumables Report.
3. Manufacturer's Instructions: Provide manufacturer published installation manuals and operations manuals for each instrument, device, or equipment.

H. Graphics

1. Not Used

I. Submittals for Closeout: Furnish submittals as required below.

1. Project Record Documents: In addition to requirements described in Section 01 78 90 - Contract Close Out, provide the following:
 - a. Program documentation: Provide paper copies of all software development and configuration including listing of all register tables.
 - b. Include functional narrative description of the developed ladder logic to describe each control system. Ladder logic is to be annotated as specified in Section 40 94 43 - Programmable Logic Controller

Systems to include functional alphanumeric description of logic elements to assist OWNER in understanding the ladder logic for troubleshooting and future modification.

- c. Program copies: Provide two digital copies of fully configured systems. Provide digital copies in CD-ROM format and USB storage drive format.
- 2. Operation and Maintenance Data: Provide operation and maintenance manuals as specified in Division 1. Include the following information:
 - a. Recommended spare parts list.
 - b. Manufacturer approved repair and service centers list.
 - c. Replacements part sources.
 - d. Recommended maintenance procedures and frequencies.
- 3. Warranty: Provide warranty certificate as described in Section 01 78 90 - Contract Close Out.

1.9 RESPONSIBILITY

- A. SYSTEM INTEGRATOR: provide application software programming as specified in Section 40 90 50 - Process Control System Description.
- B. SYSTEM INTEGRATOR: prepare Interconnecting Wiring Diagram Drawings for the Process and Instrumentation Control System.
- C. ELECTRICAL CONTRACTOR: provide Interconnecting wiring and terminations for the System under Division 26, in accordance with the Interconnecting Wiring Diagram Drawings.
- D. CONTRACTOR: immediately correct incomplete or deficient Work discovered during application software programming, downloading, testing, troubleshooting, and System startup. Use interim modifications or patches as required to maintain 24 hr x 7 day operation.
- E. SYSTEM INTEGRATOR: responsible for configuration, coordination, and addressing of Cellular networks for the devices specified herein and as shown on the Drawings. Where additions to existing plant networks are required, request the range of available addresses from the OWNER and coordinate requirements.
- F. SYSTEM INTEGRATOR: for Process Control System control panels, components, and ancillaries specified under this section:

1. Coordinate to ensure that: The proper size, type, and number of PCS related raceways and conductors are provided and installed.
 2. Complete panel fabrication drawings.
 3. Provide the specified submittals.
 4. Provide panels, components, and ancillaries.
 5. Provide programming and configuration of PCS components.
 6. Provide instructions, details, and advice to and coordinating with the CONTRACTOR to ensure proper installation.
 7. Certify correctness of installation.
 8. Verify final power and signal connections and labeling (lugging and connecting).
 9. Adjust and calibrate components and devices.
 10. Perform Start-up
 11. Perform Testing
- G. For systems, components, and ancillaries not provided under this Section but that are directly connected to components provided under this Section.
1. Obtain manufacturers' information regarding installation, interface, function, and adjustment.
 2. For operation and control, verify that installations, interfacing signal terminations, and adjustments have been completed in accordance with manufacture's recommendations.
 3. Testing to demonstrate proper interface and operation with PCS.
 - a. Examples of items included in this category are:
 - (1) Pressure Measurement

1.10 APPLICATION SOFTWARE PROGRAMMING

- A. SYSTEM INTEGRATOR: provide application software programming as required in this and related Sections. Download and test application software programming after successful completion of Process Control System Factory Acceptance

Testing specified in Section 40 98 50 and Process Control System Commissioning in Section 40 80 50.

- B. SYSTEM INTEGRATOR: perform all work in accordance with Waukesha Water Utility SCADA standards.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. General: Deliver, store, and handle all products and materials as specified in Section 01 60 00 - Material and Equipment.
- B. Acceptance at Site: Inspect all materials and equipment against approved shop drawings at time of delivery. Immediately return for replacement or repair any equipment or materials damaged or not meeting requirements of approved shop drawings.
- C. Storage and Protection: Label all equipment and materials after they have been inspected. Store all equipment and materials in dry, covered, ventilated location. Protect from harm in accordance with manufacturer's recommendations.

1.12 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Protect all equipment and instruments specified herein from moisture. Site is a valve vault with potential for water immersion. Process control equipment may be located outdoors and subject to temperatures from -20F to +120F, with rain, and 100% humidity.

1.13 SEQUENCING AND SCHEDULING

- A. Prerequisite Activities and Lead Times: Do not start following key Project activities until prerequisite activities and lead times listed below have been completed and satisfied:

1. Shop Drawing Reviews by ENGINEER:

- a. Prerequisite: RESIDENT PROJECT REPRESENTATIVE's acceptance of Schedule of Values and Progress Schedule.

PART 2 PRODUCTS

2.1 GENERAL

- A. Provide hardware consisting of ruggedized components designed specifically for the site conditions. Refer to other sections for appropriate NEMA requirements.

- B. Provide only new, standard, first-grade materials throughout, conforming to standards established by Underwriter's Laboratories (UL), Inc., and so marked or labeled, together with manufacturer's brand or trademark.
- C. Provide material and equipment in accordance with applicable codes and standards, except as modified by the specifications.
- D. Coordinate instrumentation to assure proper interface and system integration. Provide signal processing equipment, to include, but not be limited to, process sensing and measurement, transducers, signal converters, conditioners, transmitters, receivers, and power supplies. Coordinate the various subcontractors, equipment suppliers, and manufacturers.

2.2 SYSTEM ARCHITECTURE

- A. SYSTEM INTEGRATOR: responsible to configure and program the PCS to provide control and monitoring of all instruments, devices, and equipment connected to the PLC system as described in this Contract.

2.3 MONITORING AND CONTROL – GENERAL

- A. Functional descriptions of the processes and equipment to be monitored and controlled by (or through) the Process Control System are specified in Section 40 90 50 - Process Control System Description.

2.4 SYSTEM HARDWARE

- A. Provide all hardware and ancillary equipment required to provide a fully functional PCS, as specified in Division 40 and other Divisions.

2.5 SYSTEM INTEGRATION

- A. Provide system integration of the complete PCS. Complete PCS is defined as system integration may require the installation of additional pieces of equipment to make the PCS a reliable, safe, maintainable, and fully functional system. Such equipment includes, but is not limited to, communication modules, terminations, wires, cables, connectors, power supplies, transceivers, transducers, signal isolators, power surge suppressers, lights, switches, circuit breakers, fuses, power receptacles, fans, and communication devices.
- B. Provide all additional pieces of equipment as necessary to provide a fully integrated, fully operative PCS with fully functional signal interfaces to field instrumentation.

- C. System integration requires thorough testing of all system equipment and circuits under all probable system conditions to ensure a robust PCS.

2.6 GRAPHIC DISPLAY REQUIREMENTS

- A. Not Used

2.7 CABLES AND CONNECTORS

- A. Provide wiring, connectors, and cables to connect the equipment.
- B. Clearly label all cables at both ends according to requirements of electrical identification.

PART 3 EXECUTION

3.1 GENERAL

- A. Provide the detailed hardware configuration, integration, construction, testing, startup, installation, and demonstration of all equipment.
- B. Install all equipment at the OWNER's facilities in accordance with applicable federal, state, and local codes. Supervise the installation and be responsible for the performance of the completed system.
- C. Provide for the protection, insurance, and proper storage of equipment. In the event the equipment is damaged, for whatever reason, repair or replace, as required, the damaged equipment at no cost to the OWNER until Final Acceptance.
- D. Provide coordination of the overall PCS for resolution of interface discrepancies between the PCS input/output hardware, panels, equipment, instrumentation, and final control devices. Where interface conflicts exist, provide resolution to the problems and document them in writing to the RESIDENT PROJECT REPRESENTATIVE. Keep Drawings current with all changes.
- E. Provide operations and maintenance manuals, record drawings, documentation and warranty as described elsewhere in the Specifications.

3.2 EXAMINATION

- A. Verify equipment locations and delivery routes prior to installation to ensure the equipment will fit in the available space. Investigate and make any field modifications necessary to allocated space for new equipment.

3.3 PROTECTION

- A. Maintain site security.
 - 1. Verify that all enclosures which were opened during the day are locked when leaving.
 - 2. Do not leave unlocked enclosures unattended for longer than 30 minutes.

3.4 INSTALLATION AND WIRING

- A. Install wiring to interface the PCS components to field devices for all points on the Contract Documents, in accordance with the recommended methods and practices of the manufacturers of the field devices and the manufacturer of the PCS.
- B. Resolve all interface problems. Supply all additional hardware, signal isolators, media converters, signal converters, transceivers, relays, and other required components as necessary to properly interface each field I/O point to the PCS.
- C. Provide and keep a neatly marked set of record wiring drawings on the job site showing the installed location and routing of all wiring, including spares, and instrumentation cable runs, and also showing all terminal connections. Provide these drawings showing as a minimum:
 - 1. All wiring between PCS components and field devices and/or panels, including terminal and wire numbers for all wiring.
 - 2. All PCS communication wiring and interconnection.
 - 3. All interconnections between any PCS components.
 - 4. All power connections to PCS components.
- D. Keep drawings current with the work as it progresses, subject to inspection by the RESIDENT PROJECT REPRESENTATIVE at any time.

3.5 FIELD QUALITY CONTROL

- A. Tests and Inspection: Provide tests as required in Section 40 80 50 - Process Control System Commissioning.
- B. Inspection: Demonstrate that instruments, panels, programming equipment and network equipment:
 - 1. Has not been damaged by transportation or installation,
 - 2. Has been properly installed,

3. Has no mechanical defects,
 4. Is in proper alignment, and
 5. Has been properly connected.
- C. Testing Process:
1. Test digital inputs and outputs by actual starting and stopping of equipment when possible, or with jumpers at field equipment terminals.
 2. Conduct all tests in presence of ENGINEER, and RESIDENT PROJECT REPRESENTATIVE.
- D. Manufacturers Field Service: Provide manufacturer field service for calibration, initial setup, programming, and commissioning of each instrument.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 40 90 50

PROCESS CONTROL SYSTEM DESCRIPTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section 40 90 50 includes requirements for furnishing and installing instrumentation and control systems including all work and materials necessary to perform control and monitoring functions as illustrated on drawings, and as specified in this document.
- B. Related work specified in other sections includes, but is not limited to the following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 40 80 50 - Process Control System Commissioning
 - 3. Section 40 90 00 - Process Control System General Requirements
 - 4. Section 40 91 00 - Process Control System Instruments
 - 5. Section 40 94 13 - Process Control Systems Computer and Network
 - 6. Section 40 94 43 - Programmable Logic Controller Systems
 - 7. Section 40 95 13 - Process Control System Panel Enclosure and Equipment
 - 8. Section 40 98 50 - Process Control System Factory Acceptance Testing

1.2 SYSTEM SUPPLIERS

- A. CONTRACTOR: furnish all labor, materials, equipment, and incidentals as shown, specified, and required to furnish, install, calibrate, test, start-up, and place in satisfactory operation a complete process control system.

1.3 SYSTEM DESCRIPTION

- A. General Description of Work
 - 1. Provide process control applications for the V-RF08 control system as shown and as specified in this document to provide a complete control system including networking and software development.
 - 2. The Instrumentation and Control documents are requirements to assist the CONTRACTOR with the detailed design of control system including networks and communication with existing facilities' Process Control System (PCS).
 - 3. Perform the Site Acceptance Testing for each process equipment area individually and with other equipment as a system.

B. The Control descriptions provide the functional requirements of the Control represented in the Contract Documents.

1. Descriptions in this document will be provided as follows:

- a. Control system overview and general description.
- b. Equipment to be controlled.
- c. Major field-mounted instruments.
- d. Manual control functions.
- e. Automatic control functions/interlocks.
- f. Indications provided at local control panels/stations.
- g. Remote indications and alarms.

C. The Control descriptions are not intended to be an inclusive listing of all elements and appurtenances required to execute loop functions, but are rather intended to supplement and complement the Drawings and other Specification Sections. The Control Descriptions will be the base document for the CONTRACTOR creation of the Control Strategies. Identification of required elements, documentation, and coordination between loops are to be developed during shop drawings. Finalizing and tuning of strategies, as required by process characteristics, are to be completed during startup.

D. The project scope includes the following facilities and areas:

1. V-RF08 Valve Vault:

Isolation valves are provided intermittently along the pipeline to allow portions of the pipeline to be hydraulically isolated for maintenance purposes, or for repair scenarios in the unlikely event of pipe breakage.

V-RF08 valve vault will include instrumentation to allow pressure measurement of the pipeline. This pressure measurement is to be utilized for pressure loss alarming and indication of a possible pipe breakage.

2. Programmable Logic Controllers

a. V-RF08 Valve Vault PLC

A new PLC (PLC V-RF08) will be provided, located within the general vicinity of V-RF08 valve vault. Equipment within the valve vault to be integrated to the new PLC will include pressure indicating transmitter(s) and cellular communication hardware.

A new RTU (RTU V-RF08) will be provided, located within the control panel for V-RF08 valve vault. This RTU will communicate station status via cellular connection to the CWP.

1.4 SUBMITTALS

A. CONTRACTOR: furnish all submittals as specified herein, and as specified in Section 01 33 00 - Submittals.

B. Action Submittals

1. Product Data: Submit manufacturer's official and published product data, specifications, and installation recommendations for each item.
2. Shop Drawings: Submit shop drawings as per Section 01 33 00 - Submittals, and as required below. Include the following information in each submittal:
 - a. I/O List complete with Instrument Ranges, Alarm levels, and setpoints.
 - b. Furnish complete control description/strategies further developed from the control descriptions provided in this Specification, with a breakdown on each control mode, based on requirements of Part 3.
 - (1) Include sufficient detail for a complete understanding of each Operator controllable setpoint, failure mode, and alarm.
 - (2) Include detailed ranges, setpoints, and operator adjustments with the detailed control strategy.
 - c. Ladder logic focused diagrams, functional blocks as approved by the OWNER, and messages to carry out the program. Include the messages within the program to explain how the control program will carry out the required functions. The use of "structured text" type programming is not an acceptable alternative to ladder logic programming.
 - d. Configuration and data registers.

C. Closeout Submittals:

1. CONTRACTOR: furnish submittals as required below:
 - a. Project Record Documents: In addition to requirements described in Division 01 78 23 - Contract Closeout, furnish the following:
 - (1) Program documentation: Furnish paper copies of all software development and configuration including listing of all register tables.

- b. Operation and Maintenance Data: Furnish operation and maintenance manuals as specified in Division 01, including the following information:
 - (1) Recommended spare parts list
 - (2) Manufacturer approved repair and service centers list
 - (3) Replacements part sources
 - (4) Recommended maintenance procedures and frequencies
- c. Warranty: Furnish warranty certificate as described in Division 01.

1.5 QUALITY ASSURANCE

- A. CONTRACTOR: furnish Quality Assurance as specified in Division 01.
- B. The purpose of contract drawings and specifications is to convey information required for complete and functioning systems.
- C. SYSTEM INTEGRATOR: responsible for all details necessary to properly install, adjust, and place in operation intended systems.
- D. Meetings
 - 1. Schedule meetings as necessary at the ENGINEER'S designated office to jointly review control requirement submittals, and to coordinate and resolve any issues or discrepancies in regard to the operator interface software programming and implementation, and detailed PLC programming. Plan to attend meetings of one-day duration to jointly review all control requirements with the OWNER's representative and ENGINEER.
 - 2. At a minimum, include the following during meetings to review progress of network architecture:
 - a. Kick-Off Meeting
 - b. Controls development at 30% development
 - c. Controls development at 60% development
 - d. Controls development at 90% development
 - e. Controls development at 100% development
 - f. Testing and startup planning

- E. When requested by CONTRACTOR, OWNER, and/or ENGINEER, SYSTEM INTEGRATOR will attend Monthly Progress Meetings and Weekly Meetings as required and specified.

1.6 RESPONSIBILITY

- A. SYSTEM INTEGRATOR: provide application software programming as specified herein and in Section 40 90 00 - Process Control System General Requirements.

1.7 APPLICATION SOFTWARE PROGRAMMING

- A. SYSTEM INTEGRATOR: provide application software programming and testing as specified in this and related Sections. Download and test application software programming after successful completion of:

- 1. Process Control System Factory Acceptance Testing, as specified in Section 40 98 50.

- B. Do not begin equipment testing and startup until SYSTEM INTEGRATOR has successfully completed application software programming and testing.

- C. Refer to Section 01 14 00 - Construction Work Sequence Limitations and Constraints for specified construction limitations and constraints that affect completion of application software programming, downloading, and testing.

1.8 DELIVERY, STORAGE, AND HANDLING

Not Used.

1.9 PROJECT/SITE CONDITIONS

- A. Equipment is subject to humidity, dust, noise, and elevated and reduced temperatures.

1.10 SEQUENCING AND SCHEDULING

- A. Refer to Section 01 14 00 - Construction Work Sequence Limitations and Constraints.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 SITE MONITORING AND CONTROL

- A. Monitoring and control functions to be programmed under this Contract are outlined in the narratives described below.
- B. Provide all settings as adjustable settings based on log-in credentials.
- C. Provide time delay dampening for all alarms and trips.

3.2 V-RF08 VALVE VAULT

A. General

The valve vault includes pressure instrumentation for monitoring, indication, and alarming. Locate the process control panel for this location in the general vicinity outside of the vault. Refer to the contract drawings for point of connection and equipment locations.

1. Valve Vault (Reference drawing C303)

Isolation valves are provided intermittently along the pipeline to allow portions of the pipeline to be hydraulically isolated for maintenance purposes, or for repair scenarios in the unlikely event of pipe breakage.

V-RF08 valve vault will include one isolation valve, and instrumentation to allow pressure measurement of the pipeline.

a. Control Equipment:

- (1) Provide one (1) pressure indicating transmitter within the valve vault to measure pipeline water pressure. Hardwire the pressure transmitter to PLC V-RF08. Provide pipeline pressure monitoring by PLC V-RF08. Provide pressure instrumentation as specified under Section 40 91 00 - Process Control System Instruments.
- (2) Provide one (1) pressure indicator of the digital type within the control panel to display continuous pressure measurement. Hardwire the digital indicator to PLC V-RF08. Provide pressure instrumentation as specified under Section 40 91 00 - Process Control System Instruments.

- (3) Provide one (1) pressure gauge within the valve vault to provide local pressure indication. Provide pressure instrumentation as specified under Section 40 91 00 - Process Control System Instruments.

b. Control Operation:

- (1) Provide monitoring and displaying of continuous pressure signal from the pipeline pressure indicating transmitter to SCADA via cellular network communication to CWP/RFPS.
- (2) Provide displaying of continuous pressure signal from PLC V-RF08 to the digital type pressure indicator within the control panel.
- (3) Provide local pressure indication by the pressure gauge located within the vault.
- (4) Provide adjustable, time delayed warning alarms in SCADA for falling pressure:
 - (a) Low-Low Pressure (20 psi)
 - (b) Low Pressure (25 psi)
 - (c) Time delays shall be adjustable between 15 seconds and 120 seconds to allow for transients.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 40 91 00

PROCESS CONTROL SYSTEM INSTRUMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section 40 91 00 specifies the requirements for furnishing, installing, and placing into operation field-mounted instrumentation.
- B. It is the CONTRACTOR's responsibility to provide a complete functional system. Provide all instrument devices that are necessary for a complete system. This includes, but is not necessarily limited to, terminal blocks, fuses, signal conditioners, power supplies, transient and surge protection, special wires/cables and connectors, and any other electronics that may be necessary to properly interface with the instrumentation provided.
- C. Comply with the American Iron and Steel (AIS) requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, further described in the Bid Form.
- D. Related work specified in other sections includes, but is not limited to, the following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 40 80 50 - Process Control System Commissioning
 - 3. Section 40 90 00 - Process Control System General Requirements
 - 4. Section 40 94 13 - Process Control Systems Computer and Network Hardware
 - 5. Section 40 94 43 - Programmable Logic Controller Systems
 - 6. Section 40 95 13 - Process Control System Panel Enclosure and Equipment
 - 7. Section 40 98 50 - Process Control System Factory Acceptance Testing

1.2 REFERENCES

- A. Instrumentation, Systems, and Automation Society ISA-S50.1, current edition, Compatibility of Analog Signals for Electronic Industrial Process Instruments
- B. Underwriters Laboratories, UL508, standards for industrial control equipment.
- C. National Electrical Manufacturers Association (NEMA), Pub. No. 1CS-6, enclosures for industrial controls and systems.
- D. National Fire Protection Association (NFPA), Std.70, current edition, National Electric Code (NEC).

1.3 SUBMITTALS

A. General: Provide all submittals as specified herein, and as specified in Section 01 33 00 - Submittals.

B. Action Submittals:

1. Provide Shop Drawings as required below. Organize the submittal in a logical manner and have a schematic diagram for each system.
 - a. Provide complete and detailed system schematic drawings showing all components with the electrical point to point connections of each system (wiring and piping diagrams). Include a description of the operation of the system and equipment.
 - b. Provide instrumentation equipment specifications: Include manufacturer's catalog information showing product data, outlines, dimensional drawings, and instructions for installation, storage, handling, and protection. Duplicate equipment may be covered by one set of literature.
 - c. Provide updated Instrument Data Sheets showing actual manufacturer and devices selected, with all fields completed. Submit data sheets in electronic format and editable with file naming based on the device tag.
2. Include the following for each model instrument provided under Division 40:
 - a. Manufacturer's design and performance specification data and descriptive literature (catalog cutsheets)
 - b. Equipment dimensioning and installation requirements and recommendations.
 - c. Electrical signal and power connection diagrams.
 - d. Required accessories lists.
3. For each instrument specified in the sections which follow, include the following information in the submittal for that section:
 - a. Tag number and description.
 - b. Complete model number.
 - c. Data sheets and catalog literature edited to indicate specific items provided.

- d. Mounting details for all typical installation requirements and special details for non-typical applications.
- e. Methods and materials required for installation. Include power and signal connection details.
- f. List of spare parts provided.
- g. Other specific submittal information as specified in the particular instrument specification.

C. Informational Submittals:

- 1. Provide the following for information only:

- a. List of optional accessories.

D. Closeout Submittals:

- 1. Refer to Section 01 78 00 - Contract Close Out.
- 2. Include the following for each model instrument provided under Division 40:
 - a. Operations and maintenance manuals for each type of instrument after product approval.
 - b. Calibration certifications from the manufacturer for each calibrated instrument.
 - c. Provide written loop-calibration report as specified in Part 3 of this document.
 - d. List of recommended spare parts
- 3. Instruction Manuals
 - a. Operation and maintenance information: provide complete descriptive literature/shop drawings for each piece of equipment, including a list and description of all parts of each piece of equipment and instructions for calibration, testing, and maintenance requirements.
 - b. Project Record Documents: provide revisions from the Approved shop drawings and previous submittals. This includes as built records such as instrument ranges and actual component/instrumentation locations, including sources of control power.

- c. Provide revised or updated Instrument Data Sheets, P&IDs (I&C series drawings), and process flow diagrams showing location of instrumentation and equipment including calibration data.

4. Maintenance Material Submittals:

- a. Provide list of recommended spare parts
- b. Provide list of special tools necessary for normal operation, maintenance, and calibration.

1.4 QUALITY ASSURANCE

- A. Provide instrumentation of rugged construction designed for the site conditions. Provide only new, standard, first-grade materials throughout, conforming to standards established by Underwriter's Laboratories (UL), Inc., and so marked or labeled, together with manufacturer's brand or trademark.
- B. Provide material and equipment in accordance with applicable codes and standards, except as modified by the specifications. Acknowledge instances where specified requirements deviate from applicable codes and standards.
- C. Use single source manufacturer for each instrument type. Use the same manufacturer for different instrument types whenever possible.
- D. Provide all instrumentation and components from manufacturers who have no less than five (5) years (per manufacturer) of experience in providing equipment and components similar to that which is to be provided for this Work.
- E. Coordinate instrumentation to assure proper interface and system integration. Provide signal processing equipment, to include, but not be limited to, process sensing and measurement, transducers, signal converters, conditioners, transmitters, receivers, and power supplies. Coordinate the various subcontractors, equipment suppliers, and manufacturers.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Each manufacturer or supplier to provide and securely attach the tag number and instructions for proper field handling and installation to each instrument prior to packaging.
- B. Each manufacturer or supplier package instrumentation to provide protection against shipping damage, dust, moisture, and atmospheric contaminants. Include a shipping label which contains the following information:
 - 1. Tag number and description

2. Instructions for unloading, transporting, storing, and handling at the site

- C. CONTRACTOR: Provide for unloading, transporting, storing, and handling instrumentation at the site. Inspect instrumentation for damage in shipment and return damaged instrumentation to the manufacturer.
- D. Do not store instrumentation out-of-doors. Provide dry, permanent storage facilities.

1.6 WARRANTY

- A. Warranty the instrumentation, materials, workmanship, and installation to be free from defects for a period of one year from the date of Final Acceptance of the Work. Extend standard manufacturer's warranties as necessary to ensure coverage. Document warranty coverage immediately prior to Final Acceptance.
- B. Furnish and install replacement parts during the warranty period for any defective component at no additional cost. Replace spare parts consumed during the warranty period with new equipment at no additional cost, immediately after use, to restore the spare parts inventory. A complete contingent of unused spare parts should exist one year after Final Acceptance.

1.7 MAINTENANCE

- A. Provide spare parts as specified in the individual instrument sections.
- B. Provide special tools necessary for normal operation, maintenance, and calibration.
- C. Package spare parts in a manner suitable for long term storage and adequately protected against corrosion, humidity, and temperature.

PART 2 PRODUCTS

2.1 GENERAL INSTRUMENTATION REQUIREMENTS

- A. Provide instruments which operate on 115 VAC, single phase, 60 Hertz electrical service, unless otherwise specified, and which return automatically and immediately to accurate measurement upon restoration of power after a power failure, except where specifically noted.
- B. Provide open and short circuit protection except for two-wire transmitters.
- C. Provide two-wire transmitter power supplies in local panels or enclosures with receiver/indicator/transmitter as required. Loop power supplies are to be installed in the PLC cabinets complete with a separate fuse and blown fuse indicator for each analog circuit.

- D. Provide fuses or switches for equipment as recommended by the instrument manufacturer.
- E. Provide instrument transmitters which produce isolated 4-20 mA DC analog signals. Follow ISA-S50.1. Provide process transmitters of the smart electronic type devices capable of driving a load of at least 1000 ohms with non-interacting zero and span adjustments and remote recalibration features.
- F. Provide each transmitter with an integral junction box with terminal strip, integral test jacks, and conduit connection, and complete with all mounting accessories.
- G. Provide signal isolators as necessary to resolve interface problems between field instruments, final control elements, panel instruments, and PCS components. Signal isolation may require the inclusion of one or more isolated signal converters for analog circuits and one or more interposing relays for discrete circuits.
- H. Where interposing relays are required to provide proper contact rating from devices interfacing to the PLC, install the relays in the PLC cabinets. Refer to Section 40 94 43 - Programmable Logic Controller Systems.
- I. For each field mounted instrument (transmitter, analyzer, gauge, etc.) requiring 120 VAC, provide an individual non-fused disconnect switch with auxiliary contact (switch position indication) to allow for remote monitoring and indication functionality. Provide Pass & Seymour PS30SSAX, Square D Class 2510-Type KW1, or NEMA rated required disconnect as required, or equal. Provide disconnect switch cover, Crouse Hinds Model DS185 or equal.
- J. For instruments that produce a pulse signal, use DC pulse frequency signals whose repetition rate is directly proportional to the process variable over a 10:1 range. Use 24 VDC power source.
- K. Provide instruments with printed circuit boards suitably coated to prevent damage by dust, moisture, fungus, and airborne contaminants. Provide all spare boards conformal coated.
- L. Provide instruments complete with all necessary accessories for installation, including mounting brackets, mounting hardware, floor stands, wall brackets, or instrument racks. Provide all stainless steel mounting hardware for surface, panel, or handrail mounting as required by location. Provide mounting hardware that meets the requirements of the area.
- M. Use linear, direct reading indicators unless otherwise specified. Provide local gauges having minimum 4-1/2 inch dials with white scales containing black division marks, and based on multiples of 10 where practical.

- N. Provide instrument enclosures NEMA rated for the environment. In hazardous areas, meet the NEC Class, Group, and Division as shown or specified. In areas subject to flooding, provide submergence rated enclosures.
- O. Provide sun shields for all outdoor enclosures and indicators.
- P. Provide tool kits and test equipment, as recommended by the manufacturer, necessary for assembling, calibrating, and maintaining equipment.
- Q. Provide each instrument with engraved phenolic nametag, white with black letter, 1/2-inch tall minimum showing device ID.

2.2 FIELD MOUNTED DIGITAL INDICATORS

- A. Type: Electronic, 4-Digit LED, 0.56-inch high display
- B. Input Impedance: no greater than 250 ohms.
- C. Power Source: 115 V, 60 hertz
- D. Input Signal: 4-20 mA DC
- E. Input Dampening: Adjustable
- F. Enclosure: Provide indicators for outdoor mounting within the Nema 4X control panel.
- G. Accuracy: +/- 0.05 percent of span +/- 1 count
- H. Decimal Point: Selectable via DIP switches or keypad.
- I. Input Connections: Compression type screw terminals
- J. Range Selection: DIP switches, multiturn potentiometers, or keypad.
- K. Manufacturers:
 - 1. Precision Digital PD765
 - 2. Or approved equal

2.3 PRESSURE GAUGES

- A. Provide pressure gauge rated for continuous submergence in water.
- B. Type: Dial-indicating bourdon tube

C. Performance Requirements:

1. Operating Range: As specified in Instrument List or as required by process.
2. Accuracy: ± 0.5 percent of maximum scale reading.
3. Ambient Temperature Limits: -40 degF to 149 degF, minimum.

D. Construction Features

1. PVC body with 316 stainless steel diaphragm
2. Liquid (Silicone) filled
3. Stainless steel movements
4. Case Material: Black Phenolic, solid type, hermetically sealed (NEMA 4X)
5. Aluminum gauge dial, nominal size of 4-1/2 inch. Linear scale, white face with black numerals and markings
6. Process Connection: Bottom, 1/2-inch NPT with 316 SS male fitting extending a minimum of 1-1/4 inches beyond the case
7. External Mounting Lugs
8. Safety Classification: As specified in the Instrument List

E. Manufacturers:

1. WIKA
2. Ashcroft
3. Or approved equal

2.4 PRESSURE TRANSMITTERS

- A. Provide pressure transmitters rated for continuous submergence in water.
- B. Provide transmitters of the microprocessor based "smart" electronics, two-wire, loop powered (24 VDC) and HART compatible devices.
- C. Accuracy: ± 0.10 percent of calibrated span, with response time of less than one (1) second.
- D. Load resistance: 1000 ohms; Turndown Capability: Minimum of 50:1.

- E. Span and zero continuously adjustable, either locally or via hand-held digital interface.
- F. Ambient Temperature Limits: -40 degF to 149 degF, minimum.
- G. Provide transmitter housing and diaphragm materials as follows:
 - 1. Body and Process Connection Bolting: Type 316 SS
 - 2. Housing and Cover: Die cast low copper aluminum alloy finished with epoxy paint system; cover threaded and seated on Buna-N O-rings
 - 3. Process Wetted parts: 316 SS
 - 4. NEMA 4X rating.
- H. Integral 4-digit LCD output indicator graduated 0-100 percent.
- I. 1/2-inch NPT process connections.
- J. Provide transmitter with 2-valve manifold (absolute/gauge pressure). Provide transmitter and manifold as one fully tested complete assembly.
- K. Safety Classification: As specified in Instrument List or as required per process area.
- L. Manufacturers:
 - 1. WIKA (No substitution)

2.5 PROCESS TAPS, SENSING LINES, AND ACCESSORIES

- A. Pressure Tap Sensing Lines and Accessories for Pressure Gages and Pressure Switches
 - 1. For Process Sensing Taps in Ductile Iron, Steel, and Stainless Steel Piping Systems:
 - a. Material and Fittings: Type 304 stainless steel pipe (ASTM A 312) and threaded fittings and adapters (ASTM A 403).
 - b. Sizes: 1/2-inch minimum for main sensing piping and 1/4-inch gage and switch connections.
 - c. Accessories:

- (1) Provide separate 1/4-inch Type 316 stainless steel threaded gauge cocks for each gauge and switch.

2.6 SIGNAL LINE TRANSIENT PROTECTION

- A. Provide all signal lines for solid state electronic equipment equipped with line voltage surge suppressors to protect the equipment from damage due to electrical transients induced in the interconnecting lines from lightning discharges or nearby equipment.
- B. Include signal line transient protection for, but not be limited to, digital inputs, analog inputs, and analog outputs.
- C. Include signal line transient protection for gas discharge tubes, varistors, and suppressor diodes.
- D. Provide Phoenix Contact terminal block type unit consisting of protective plug and base element, with integrated multi-stage status indicator, Model PT-IQ-1X2+F, or approved equal.
- E. Provide DIN rail type terminal block, mounted in the vertical position.
- F. Provide lightning protection termination for all digital and analog signals, plus a minimum of 10 percent spares per panels.
- G. Field instruments, for 24 VDC analog signals
 1. Manufacturers: Phoenix Contact PIPETRAB series.
 2. Conduit Mounted: Protection circuit mounted 3/4 inch (19 mm) stainless steel pipe nipple.
 3. Provide surge protection for analog and digital I/O designed to withstand a 10kA test current of a (8/20) microseconds waveform according to IEC 1024 Application Guide A and ANSI/IEEE C62.41 Category C Area.
 4. Provide surge protection of a multistage hybrid circuit utilizing only diodes and gas discharge tubes but no Metal Oxide Varistors (MOVs).
 5. Resistance: Less than 10 ohms of series resistance.
 6. Provide surge protection with response time less than 1 microsecond.
 7. Maximum Continuous Operating Voltage: Not to exceed 28V DC.
 8. Cutoff Frequency: Less than 400 kHz (for a 600 ohm system) to allow HART protocol and other superimposed smart digital signals to function.

9. Operating Temperature Range: -40 degF to 149 degF, minimum.

PART 3 EXECUTION

3.1 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate installation of transmitters and gauges with piping and equipment installers.

3.2 EXAMINATION

- A. Examine the Drawings and the site for placement of instrumentation. Investigate the space in the structure(s) through which the equipment must pass to reach its final location. Make provisions to move the instrumentation into place. Notify the RESIDENT PROJECT REPRESENTATIVE of any clearance problems.
- B. The instrument installation details show general intent. They are not to scale. Secure and utilize instrument mounting details from the manufacturer or supplier for installation purposes.

3.3 INSTALLATION

- A. Provide labor, materials, tools, equipment, supplies, services, and auxiliary devices including, but not limited to, brackets and mounting hardware to install the instrumentation. Install all devices as specified and shown on the Contract Drawings and in accordance with manufacturer's requirements. The CONTRACTOR is responsible for any problems resulting from any deviation from manufacturer installation instructions.
- B. Unless readily accessible for viewing and calibration from floor elevation, do not mount direct reading or electrical transmitters on process piping. Install all transmitters vertically, with the integral indicators facing front or sides. Install on instrument racks or stands or in enclosures near the sensor at a level that permits viewing from floor elevation. For pipe mounted instruments, provide sufficient clearance to permit 360° access to the units.
- C. Install the instrumentation and auxiliary devices to be accessible for maintenance. Provide space between instruments and other equipment and piping for ease of removal and servicing. Generally, install instrumentation to be accessible from floor level or grade. Permanent ladders or platforms may be required for instrumentation which must be installed in overhead locations.
- D. Attach a durable stainless steel tag using stainless steel wire or stainless steel drive screws to each primary element, transmitter, and field mounted readout device. Permanently engrave the tag with the instrument tag number and description as given in the Instrument List for each instrument. Include manufacturer's name and

model number if not discernible on the instrument. Provide tags which are a minimum of 1"x 3" size, 1/16" thick, with characters 1/4" high (minimum).

- E. Seal all conduit and wiring entries into all instruments installed below ground or in vaults with non-setting transparent potting material. Provide water tight seals, suitable for submergence in 30 feet of water.
- F. Follow additional installation requirements as specified in the individual instrument sections and as recommended by the manufacturer.

3.4 TRAINING

Not Used.

3.5 FIELD QUALITY CONTROL

- A. Provide instrument manufacturer services for installation assistance, field calibration, and startup as specified herein.
- B. Remove shipping stickers, paint splatters, dirt, grease, and other contaminants to restore the instrumentation to a clean and like new condition prior to Final Acceptance.

3.6 MANUFACTURER'S SERVICES

- A. CONTRACTOR: Provide installation inspection, of all work provided under this Section, by an authorized manufacturer's representative, and provide a certificate of proper installation.
- B. CONTRACTOR: provide the services of an experience, authorized manufacturer's representative (Salesperson does not qualify) for the equipment specified herein to be present at the jobsite for the minimum man-days listed for the services shown below, time travel excluded:
 - 1. One (1) man-day per site for inspection, start-up, functional testing, and certificate of proper installation.

3.7 DEMONSTRATION

- A. Prepare an instrumentation installation and calibration certification sheet for each primary element sensor and electronic indicator/analyzer/transmitter for each instrument uniquely specified. Use these sheets for documenting installation and testing. Provide copies of completed instrument certification sheets to the OWNER's Maintenance Group.

- B. Calibrate each instrument, including its complete instrument loop. Provide indication via digital indicator within the control panel equal to readings at local transmitter indicators.
- C. Loop-Calibration: Provide written loop-calibration report for each instrument loop, including, but not limited to the following:
 - 1. Project Name
 - 2. Tag Number and Service Description
 - 3. Manufacturer
 - 4. Model and Serial Number
 - 5. Date, time, and names and signatures of factory personnel performing calibration
 - 6. Weather conditions at the time the final calibration was performed
 - 7. Comparison of readings at the local transmitters with readings at the remote receiving instruments.
 - 8. Verification of operation of all contact outputs, including those at the receiving instruments.
 - 9. Description of method of calibration.
 - 10. Calibration data to include:
 - a. Table showing calculated and measured values at 0%, 25%, 50%, 75%, and 100%.
 - b. Input, output, and error at 0, 25, 50, 75, and 100 percent of span for analog instruments.
 - c. Switch setting, contact action, and deadband, if applicable, for discrete elements.
 - d. Space for comments.
 - 11. Certification by installer and acknowledgment by CONTRACTOR and date.
 - 12. Names and signatures of OWNER representative witnessing calibration process.

3.8 INSTRUMENT LIST

- A. The Instrument List included herein indicates all minimum required instruments for the project, and is not be considered a complete list, and is to be used as reference material.
- B. The Instrument List does not include all details that must be coordinated during project implementation. However, columns have been provided in the Instrument List to facilitate inclusion of this information as the project installation progresses.
- C. CONTRACTOR: follow the OWNER-approved format included herein.
- D. See list below:

INST TAG	SERVICE DESCRIPTION	P&ID	TYPE	SCALE	RANGE	AREA CLASS	VENDOR	MODEL NO.	SPEC
PIT-6601	Return Flow Pipeline Pressure	C303	Pressure Indicating Transmitter	4-20 mA	TBD	N/A	WIKA	By Vendor	40 91 00 2.4
PI-6601	Return Flow Pipeline Pressure	C303	Pressure Gauge	N/A	TBD	N/A	WIKA	By Vendor	40 91 00 2.3
PI-6602	Return Flow Pipeline Pressure	C303	Pressure Indicator	N/A	TBD	N/A	PRECISION DIGITAL	By Vendor	40 91 00 2.2

END OF SECTION

SECTION 40 94 13

PROCESS CONTROL SYSTEM COMPUTER AND NETWORK HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. Section 40 94 13 specifies requirements for providing computer and network equipment for a Process Control System (PCS), including software package as required.
- B. CONTRACTOR: Provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and implement a fully functional Process Control System.
 - 1. Work includes all software elements of the PCS system specified. Provide a complete PCS system including software configuration as part of the work. The hardware required for the PCS is composed of the following types of major monitoring processing and control equipment units:
 - a. PLC including processor, chassis, I/O cards, communication cards, etc. as specified in related Sections.
 - b. Cellular network communication devices.
- C. Related Work Specified in Other Sections Includes, But is Not Limited to the Following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 40 80 50 - Process Control System Commissioning
 - 3. Section 40 90 00 - Process Control System General Requirements
 - 4. Section 40 90 50 - Process Control System Descriptions
 - 5. Section 40 91 00 - Process Control System Instruments
 - 6. Section 40 94 43 - Programmable Logic Controller Systems
 - 7. Section 40 95 13 - Process Control System Panel Enclosure and Equipment
 - 8. Section 40 98 50 - Process Control System Factory Acceptance Testing

1.2 SYSTEM DESCRIPTION

- A. PLCs are specified under Section 40 94 43 - Programmable Logic Controller Systems.

1.3 SUBMITTALS

- A. General: Provide all submittals as specified herein, and as specified in Section 01 33 00 - Submittals.
- B. Action Submittals:
 - 1. Provide all documentation corresponding to PCS software development and configuration.
 - 2. Provide hard-copy printouts of all graphics screens.
 - 3. Submit requests for network address for each system and obtain these addresses from the OWNER.
 - 4. Provide detailed project specific datasheets on hardware, software packaged by system, panel, and application.
 - 5. Provide rack, communication card, and I/O card layouts with calculations for power supplies indicating power draw and heat release for each rack and power supply.
- C. Closeout Submittals:
 - 1. Provide fully documented electronic editable and paper copy of PLC programs, data tables, graphic screens, system addressing, and I/O Point lists to OWNER for their support of the system. Provide these submittals before each factory test, each system acceptance, and updated at the end of the warranty period.
 - 2. Provide electronic (edible copy) of the fully configured PLC code in CD-ROM format and USB storage drive format.
 - 3. Provide digital copy of the fully configured system or modifications submitted in CD-ROM format and USB storage drive format.
 - 4. Provide proof of software licenses demonstrating that the license is held by the OWNER for all licensed software.
 - 5. Provide OEM software supplied by the manufacturer for each component, including operating system, application programs, diagnostic tools, etc.
 - 6. Provide trouble-shooting procedures for hardware supplied as specified herein.
 - 7. Provide recommended preventive maintenance tasks, schedules, and instructions for hardware supplied as specified herein.

1.4 QUALITY ASSURANCE

- A. Provide the PCS system additions and modifications by a single systems integrator who also supplies the process control hardware described in Section 40 94 43 - Programmable Logic Controller System.
- B. Provide the system from a system manufacturer with a demonstrated minimum of five years of experience providing Process Control Systems, and show evidence from the system manufacturer of at least five installations of equal or greater size to the one being specified.

1.5 WARRANTY

- A. Provide warranty on the hardware and software for three years, minimum.

1.6 MAINTENANCE

- A. SYSTEM INTEGRATOR: Provide recommended preventive maintenance tasks, schedules, and instructions for hardware supplied. The PM documentation must be clear, applicable to hardware provided, concise and accurate.
- B. SYSTEM INTEGRATOR: Provide maintenance of the modifications to the PCS during the warranty period.

1.7 TROUBLESHOOTING

- A. SYSTEM INTEGRATOR: Provide trouble-shooting procedures for hardware supplied. Provide procedures that are accurate, easy to understand and follow, current, and comprehensive in scope. Provide up-to-date phone numbers and links if links to vendor website or technical support is necessary.

PART 2 PRODUCTS

2.1 GENERAL

- A. Provide PLC hardware in accordance with Section 40 94 43 - Programmable Logic Controller Systems. Coordinate with other contract package CONTRACTOR / SYSTEM INTEGRATOR to maintain compatibility with Return Flow Pumping Station PLC platform.

1. PLC system required as follows:

- a. Allen-Bradley In-Cabinet Modular I/O Platform for remote site having multiple I/O signals with data logging requirements for the V-RF08 site.

- B. Provide cellular communication system modem and appurtenances designed to interface with OWNER's preferred provider's cellular data network.
- C. Provide VPN router configured between PLC and cellular modem to establish a secure VPN tunnel across the cellular provider's network. Coordinate VPN router requirements with Return Flow Pump Station and Waukesha Water Utility.

2.2 CELLULAR COMMUNICATION

- A. General: Provide a cellular wireless network modem designed to interface with the PLC and to communicate with the OWNER's preferred provider's cellular network.
- B. Provide all hardware, including but not limited to, cabling, switches, connectors, communication modules, convertors, accessories, and appurtenances to provide a fully functional Cellular network. Provide gigabit network category rated network wiring and connections.
- C. Identify necessary network addresses, masking, and required custom configuration requirements for each network. Implement using configurations requirements assigned and furnished by the OWNER.
- D. Hardware
 - 1. 4G wireless data communication platform, minimum.
 - 2. High speed processor.
 - 3. IPsec VPN security and intelligence.
 - 4. Power: 8-30 VDC. Provide required power supply for 115 VAC input power.
 - 5. Interfaces:
 - a. Ethernet: 10/100 Mbps, RJ45
 - b. Serial: RS-232 (DB9)
 - c. USB: 2.0 (mini)
 - d. Antennas: 50 ohm, SMA connectors (antenna, diversity).
 - 6. Manufacturer:
 - a. Red Lion

b. Or approved equal

7. Antenna: Provide unity gain antenna mounted on the outside of the panel. If site is located near the edge of coverage, provide low profile external panel mounted antenna, complete with surge suppressor and cable. Coordinate with OWNER's preferred provider Network Data available from provider contact to provide maximum signal strength at the site to meet the following cellular network requirements at the PLC:

a. Download Speed: 900 Kb/s minimum

b. Upload Speed: 400 Kb/s minimum

c. Wireless Cellular Network Provider Interface

(1) Coordinate with local wireless network service to setup service for the site.

(2) Provide initial monthly data plan for the site: 10 MB minimum

(3) Arrange for a static IP address for the site. Coordinate with OWNER's preferred wireless cellular provider and the OWNER to arrange required static IP addresses for the site on the network.

2.3 VPN ROUTER

A. Provide a VPN router at the V-RF08 site between the PLC and the cellular wireless modem, interfacing with VPN router at the RFPS, to establish a secure datalink across the wireless network.

B. Coordinate the hardware requirements and software configuration for the routers with the OWNER and other contract package SYSTEM INTEGRATOR as required.

PART 3 EXECUTION

3.1 ENVIRONMENTAL CONDITIONS

A. Refer to Section 40 90 00 - Process Control System General Requirements, for project site conditions.

3.2 INSTALLATION

A. Process Control System

1. **SYSTEM INTEGRATOR:** Responsible for providing all required hardware, software, and tools for configuring, testing, and troubleshooting the monitoring and control system.
2. **SYSTEM INTEGRATOR:** Complete a full setup, including assigning node and network addresses, equipment identification, and document the setup on configuration sheets. Clearly identify parameter settings, switch settings, and software settings in the configuration sheets. Submit these sheets for record.

END OF SECTION

SECTION 40 94 43

PROGRAMMABLE LOGIC CONTROLLER SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section 40 94 43 specifies the technical requirements for furnishing, design, supply, programming, configuration, and testing of a Programmable Logic Controller (PLC) including all work and materials necessary to perform control and monitoring functions as illustrated on drawings and as described in Section 40 90 50 - Process Control System Description.
- B. Work to be provided as part of this contract includes all design engineering and the supply of a PLC system with all auxiliary equipment, components, and accessories to ensure an integral, seamless, coordinated system, as is generally described below. Supply the following as a minimum:
 - 1. Design, engineering, manufacture, assembly, configuration, shop testing, factory acceptance test, delivery, and commissioning of PLC system.
 - 2. Necessary hardware and software to interface to the OWNER's SCADA.
 - 3. Necessary hardware and software to synchronize to a GPS based master clock.
 - 4. Factory Acceptance Test of the hardware, logic, software, and data communication for each PLC cabinet.
- C. Programming and Software Configuration
 - 1. Include all programming and software configuration for the PLC as part of this Contract work. Base all programming and software configuration on control & monitoring strategies described in Section 40 90 50 - Process Control System Description.
 - 2. Comply with the recommended practices published by the hardware manufacturer. Use documented ladder logic with subroutines for programming. Follow programming and configuration convention standards published by the OWNER, if existing.
- D. Related Work Specified in Other Sections Includes, But is Not Limited to the Following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 26 05 00 - Basic Electrical Material and Methods

3. Section 40 80 50 - Process Control System Commissioning
4. Section 40 90 00 - Process Control System General Requirements
5. Section 40 90 50 - Process Control System Descriptions
6. Section 40 91 00 - Process Control System Instruments
7. Section 40 94 13 - Process Control Systems Computer and Network Hardware
8. Section 40 95 13 - Process Control System Panel Enclosure and Equipment
9. Section 40 98 50 - Process Control System Factory Acceptance Testing

1.2 SUBMITTALS

- A. Provide all submittals as specified herein, and as specified in Section 01 33 00 - Submittals.

B. Action Submittals:

1. Submit data sheets and catalog literature on each type of equipment.
2. Submit programming and installation manuals for each type of equipment.
3. Documentation:
 - a. Provide all documentation related to PLC software development and configuration.
 - b. Provide all manuals, PLC logic documentation, and application programmer's notes.
 - c. Provide listing of PLC register tables.

C. Closeout Submittals: Provide submittals as required below:

1. Provide hard copy printout of all PLC logic.
2. Provide flash drive of each documented application program.
3. As-Built Drawings: Accurately record actual locations of controller cabinets and input and output devices connected to system. Include interconnection wiring and cabling information, and terminal block layouts in controller cabinets. Include copy of manufacturer's certified drawings.
4. Operation and Maintenance Data:
 - a. Submit bound copies of operating and programming instructions.
 - b. Submit description of system operation, adjusting, and testing required.

- c. Submit card replacement, adjustments, and preventative maintenance procedures and materials.
- d. Identify system maintenance requirements, servicing cycles, lubrication types required, and local spare part sources.
- e. Provide operation and maintenance manuals in accordance with General Requirements.

5. System Documentation:

- a. System Abstract:
 - (1) Provide clear statement of task, define function of major hardware and software components.
 - (2) Design strategy used to implement solution.
 - (3) Statement of objectives.
- b. System Configuration: Pictorial drawing of hardware elements, show physical location of subsystems, designation of input/output (I/O) rack address assignments, simplified connection.
- c. Include complete wiring diagrams inputs and outputs for each PLC module, show point address assignments. If field devices are not wired directly to I/O module show terminal block number.
- d. I/O Address Assignments: Identify each field device by address based on rack group and terminal, the type of I/O module, the device, and the function the device performs in the field.
- e. Internal I/O Address Assignments: Identify used and unused addresses, show type, and description.
- f. Register Assignments: Identify each available system register, whether used for user storage register or I/O register.
- g. Program coding printout showing each programmed instruction and associated address of each input and output.
- h. Reproducible and editable stored program stored on compatible electronic media.
- i. Program coding for each PLC, in annotated ladder diagram form, include the following:

- (1) Program titles
- (2) Multiple subtitles
- (3) Date and time the documentation was last produced
- (4) Page numbering
- (5) Extensive commentaries before and after each rung
- (6) Contact or element description
- (7) Address for each contact
- (8) Pictorial representation of each instruction (coils, contacts, etc.)
- (9) Rung numbers
- (10) Rungs where each contact is used
- (11) All preset values of registers used
- (12) Identification of all internals and real inputs and outputs
- (13) Mapping of all I/O for porting over to SCADA

1.3 SPARE PARTS

A. Provide the following spare parts:

1. Twenty percent spare I/O modules of each type used for the PLC, with a minimum of one. Round up to the next whole number.
2. One PLC, including CPU, power supply, and any other accessories to provide a functioning system.
3. One wireless cellular modem with VPN capabilities
4. One analog input module of each type utilized
5. One analog output module of each type utilized
6. One power supply assembly of each type and size utilized
7. One UPS module of each type utilized
8. One dozen fuses of each size utilized

9. One dozen relays of each type utilized
10. One backplane of each type used

PART 2 PRODUCTS

2.1 PROGRAMMABLE LOGIC CONTROLLER

A. General

1. Provide PLC hardware in accordance with requirements contained in this Section. Provide System Control of the Allen-Bradley MicroLogix 1400 hardware platform type. No substitutions unless approved by OWNER.
2. Provide microprocessor based PLC, industrial CPU.
3. Provide PLC with internal or external flash memory for backup, capable of maintaining data for a minimum of one year with no power applied to the processor (power failure event). If using external flash memory, provide one (1) flash card with each CPU loaded with copy of "as commissioned" logic.
4. Provide PLC with processor capable of maintaining required data for a minimum of one year without requiring power (power failure event).
5. Provide PLC with program scan rate of less than one (1) second for low resolution and less than (1) millisecond for high resolution inputs.
6. Diagnostics
 - a. Provide PLC with standard, self-diagnostic routines provided to determine proper hardware and software operation.
 - b. Provide diagnostic LEDs on the process front panel to indicate the following: Processor fault, battery low, I/O module fault, memory card missing or faulty, communications error.
7. Provide PLC with CPU equipped with a built-in port(s) for networking and programming.

B. PLC System:

1. CPU: MicroLogix processor with non-volatile battery backed RAM. Allen-Bradley 1766-L32B or approved equal.

2. Power Supply: 120/220 VAC standard power supply.
3. I/O Rack or Chassis: Provide appropriate size chassis.
4. Communication Module: Ethernet/IP protocol enabled, 10/100Mbps, RJ-45 ports.
5. Discrete Input Module: N/A
6. Discrete Output Module: N/A
7. Analog Input Module: Allen Bradley 1762-IF Module as required.
8. Analog Output Module: Allen Bradley 1762-OF Module as required.
9. Analog RTD Module: N/A
10. Analog Thermocouple Module: N/A
11. Redundancy Module: N/A

C. Programming Software:

1. Provide the latest version of applicable programming software for Allen-Bradley MicroLogix platform.
2. Provide system capable of adapting to program changes without impacting the hardware. Provide programs protected from accidental changes by use of passwords and/or key lock switches or Cryptographic Controller Engineering Key Lock.
3. Provide the logic programming and I/O configuration printout capability.
4. Programming software to be turned over to the OWNER, if the OWNER does not already own the software, at the completion of the project.

D. Control Panel Security Requirements:

1. Include network security Anomaly Detection (AD) for the control panel that continuously monitors the controller's network and system time to detect intrusions and anomalous behavior. Include the following required functions:

- a. Dynamic Port Connection Monitoring to record all attempts to connect any controller or communication point and capture identifying information on the intruder and event.
 - b. Network Port Scanning to detect scanning for open ports that might provide access to the control network.
 - c. System Time Monitoring to detect attempts to manipulate log files to conceal malicious activity.
 - d. Intrusion Event Logging to record all detected anomalies and report them to SCADA software through OPC UA and standard database access for historian, alarming, and trending functions.
2. The above may be accomplished intrinsically through the controller or via external industrial security products from the following manufacturers:
 - a. Hirschmann Tofino
 - b. Ultra-3eti
 - c. Cisco
 - d. Rockwell Automation
 - e. Tenable Networks
 - f. Or approved equal
3. Provide availability of all security monitoring (trend, record, status) for display on a secure SCADA screen.
4. Provide any external security product used with the programming software and licensing to the OWNER as part of the project.

2.2 I/O MODULES

- A. Provide each I/O module with on-board diagnostics with on-board LEDs indicating card and point status, visible without removing any I/O cards.
- B. Provide output modules with definable, selectable for each input, failure modes upon loss of communication with the CPU.
- C. Provide all individual I/O channels individually fused and electrically isolated from the main frame CPU.
- D. Provide the system with 20% spares of each I/O type at the time of shipment to site

(after successful factory testing) and 10% spares of each I/O type at substantial completion (after Commissioning), as a minimum.

E. Analog I/O

1. Provide analog input modules with a minimum of two (2) dedicated solid state analog to digital (A/D) converter per module. Provide analog output modules with a minimum of one (1) dedicated solid state digital to analog converter (D/A) per module. Provide conversion resolution of 13 bits plus a sign bit for a total of 14 bits or better, and an absolute accuracy of 0.1 percent of full scale of the signal.
2. Provide current type analog inputs that provide 24 VDC power to the sending transmitter, or accept an isolated current signal from a field powered transmitter. Provide each analog input individually fused.
3. Provide analog outputs that provide 4-20 mA DC current and are capable of driving 750 ohm loads.
4. Provide universal transient barriers to protect analog signals from surges and transients.
5. Provide "bad" quality from the PLC for each analog input. Provide system with selectable failure modes of 0% signal, 100% signal, or hold last value.
6. Provide scan rate of all analog inputs of once per second average, with provisions for scanning at least 5% of the analog inputs at the rate of once per 0.1 second.

2.3 CELLULAR NETWORK DATALINK

A. General

1. Provide hardware, software, and engineering for a fully functional cellular datalink connection to the OWNER's SCADA to allow for remote monitoring.
2. Interface directly with the OWNER's SCADA vendor to clarify protocols, data addressing, data formats, and all other parameters required to design these data links.
3. Submit datalink database structure defining all database fields and the size, format, and acceptable entries for each field. Following review and approval by the ENGINEER, this database structure cannot be modified during the remainder of the project without prior acceptance of the ENGINEER.

4. Ensure proper isolation between each PLC and the OWNER SCADA (Wonderware), so that a failure of PLC does not cause failure of the SCADA.
5. Provide data protocol that safeguards against false data transmission, allow for error detection, failure detection/recovery, as well as automatic switchover to the redundant network.
6. Provide datalink that meets the following requirements:
 - a. Pass all points required for complete remote monitoring.
 - b. All points capable of being read from and written to in 1 second or less.
 - c. Include all software required for this cellular datalink.
 - d. Provide with the system all software tools and licenses required to modify the datalink, including database configuration. Fully document and provide the software tools to the OWNER.

B. Redundancy and Integrity

1. Ensure that no single failure of any system component (above the I/O level) or power source interrupts or disrupts any system function.
2. Ensure that no single PLC component failure causes loss of the interface link to the OWNER SCADA.
3. Ensure that all data highway interfaces are powered from redundant power sources.

2.4 GRAPHICS AND DISPLAYS

A. Not Used.

PART 3 EXECUTION

3.1 INSPECTION AND TESTING

A. General

1. Test all control and monitoring functions as described in Section 40 90 50 - Process Control System Description. Perform all testing meeting requirements of Section 40 98 50 - Process Control System Factory Acceptance Testing, and Section 40 80 50 - Process Control System Commissioning.

B. Shop Testing

1. Factory Acceptance Test (FAT)

- a. Perform FAT as specified herein, and as specified in Section 40 98 50 - Process Control System Factory Acceptance Testing.
- b. Provide a System Test Plan for approval by the OWNER/ENGINEER prior to commencement of the system checkout and Factory Acceptance Test (FAT).
- c. In the system checkout, include 100% I/O checkout, closed loop simulation of binary/modulating logic, and validation of all logic, displays, alarms, and reports where applicable.
- d. Test all power systems and verify that the system common and chassis ground are isolated from each other on all cabinets.
- e. Connect all I/O for soft simulation and test for functionality. Include the following for the simulation software:
 - (1) Simulation of 100% I/O
 - (2) Log and track all temporary logic changes
- f. Fully test the PLC side of the cellular network datalink (to OWNER's SCADA). Include verification of range and alarm limits of all I/O in the testing. Use actual addresses and protocols in the testing.
- g. Verify all system reports; trend all points; verify all performance calculations.
- h. Ship the FAT closed loop simulation software to the OWNER for use in training operators as soon after the FAT as practical.

C. Field Tests

1. PLC/SCADA Datalink Interface Testing

- a. Ship a test rack containing processor with the application program loaded to the SCADA supplier for testing of the PLC/SCADA interface. Include in the test rack: power supply, CPU, and communication module. In either case, provide personnel to support the testing of the PLC/SCADA interface.

2. Site Acceptance Test (SAT)

- a. Perform the Site Acceptance Test after the installation and commissioning of the PLC. Include the same functions and characteristics in the test as the factory checkout and acceptance tests, considering that the system will be connected to the process. Justify and correct any abnormality encountered in this test at no additional cost to the OWNER.
- b. Provide field support by qualified personnel to certify installation, verify cabling, grounding, and power up the system.
- c. Following SAT, ensure the System meets the requirements of Commissioning in Section 40 80 50 - Process Control System Commissioning.

3.2 SCHEDULES

- A. Reference drawings and the following table for list of PLCs to be supplied as part of the project. Data presented on the following table is for the convenience of the CONTRACTOR. Provide all PLCs required by the contract documents and including all components required for the operation of the equipment as described.

PLC SCHEDULE

PLC Name	Location	Comments
PLC V-RF08	V-RF08 Valve Vault Area	PLC V-RF08 consisting of one (1) PLC

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 40 95 13

PROCESS CONTROL SYSTEM PANEL ENCLOSURES AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section 40 95 13 includes technical requirements for fabrication, engineering, wiring, and installation of instrument panels and enclosures, and furnishing the panel mounted instruments and equipment. These include, but are not limited to the following:
 - 1. Panel Construction
 - 2. Panel Wiring
 - 3. Panel Mounted Equipment
- B. Related Work Specified in Other Sections Includes, But is Not Limited to the Following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 40 80 50 - Process Control System Commissioning
 - 3. Section 40 90 00 - Process Control System General Requirements
 - 4. Section 40 90 50 - Process Control System Description
 - 5. Section 40 94 13 - Process Control Systems Computer and Network Hardware
 - 6. Section 40 94 43 - Programmable Logic Controller Systems
 - 7. Section 40 98 50 - Process Control System Factory Acceptance Testing
- C. Provide all new control panels specified under this contract as indicated. This section is to provide guidelines to the electrical contractor for the design and workmanship on any new and/or existing panels to which the CONTRACTOR makes changes or modifications.
- D. CONTRACTOR: comply with the American Iron and Steel (AIS) requirements as contained in Section 436 of the Consolidated Appropriations Act, 2014, further described in the Bid Form.

1.2 SUBMITTALS

- A. General: Provide submittals as specified herein, as specified in Section 01 33 00 - Submittals, and as required in Section 40 90 00 - Process Control System General Requirements.

B. Include the following information in the submittal for this section:

1. Scaled drawings showing the location of mounted devices on face of panel, within panel, and all sides. Include a legend listing and identifying devices by their assigned tag numbers, nameplate inscriptions, service legends, and annunciator inscriptions. Include a legend listing all spec items and manufacturer's part number of each item installed.
2. Panel elementary diagrams. Include switched analog signals, panel power distribution, and ancillary devices such as relays, alarms, fuses, lights, fans, heaters, etc. Show circuits and components individually. Show panel terminal and wire identification numbers. Do not submit typical diagrams for multiple circuits.
3. Power requirement and heat dissipation summary for all panels. State required voltages, currents, and phase(s). State maximum heat dissipation in Btu/hr.

C. Action Submittals

1. Product Data: Submit manufacturer's official and published product data, specifications, and installation recommendations for each item. Include terminal wiring details, specific features such as ranges and options, and manufacturing data in the product data.
2. Shop Drawings: Include the following information:
 - a. Bill of materials
 - b. Panel construction details and dimensions (front, internal)
 - c. Internal wiring diagrams, including wire type, size, and identification number
 - d. PLC card layout and wiring
 - e. Terminal block layout
 - f. Nameplate lists
 - g. Color schedules
 - h. Elementary control diagrams
 - i. Equipment weights

3. Provide loop diagrams conforming to ISA-S5.4 - Instrument Loop Diagrams.
- D. Closeout Submittals: Provide submittals as required below.
1. AS Built Drawings
 2. Test Reports
- 1.3 QUALITY ASSURANCE
- A. Comply with the applicable provision of the following codes and standards:
1. Underwriters Laboratory (UL)
 - a. UL50 Enclosures fore Electrical Equipment
 - b. UL508 Industrial Control Equipment
 - c. UL870 Wireways Auxiliary Gutters and Associated Fittings
 2. Electrical Testing Laboratory (ETL)
 3. National Electrical Code (NEC)
 4. National Fire Protection Association (NFPA) 79, Electrical Standard for Industrial Machinery
 5. International Society of Automation (ISA)
- B. Provide all new electrical materials and equipment bearing the label of the Underwriters' Laboratory (UL), Inc., Factory Mutual (FM) or equivalent where standards have been established and label service regularly applies.
- C. Provide all Process Control System Panels provided as part of Division 40, including PLC panels, complying with the requirements of UL-508A, NFPA 79, and NEC Article 409 - Industrial Control Panels.
- D. Provide integrated process control systems. Assign complete responsibility for furnishing, coordination, assembly, and installation supervision of all equipment to one Systems Integrator regularly engaged in the manufacture, assembly, and production of systems of type specified. Provide complete, satisfactory, and trouble-free operating installation.
- E. Provide like instruments from the same manufacturer. Minimize number of different manufacturers.

- F. Provide safety and regulatory labels required by NEC, NFPA, and UL.
- G. Tests and Inspection:
 - 1. Test each panel in conjunction with factory acceptance test as described in Section 40 98 50 - Process Control System Factory Acceptance Testing.

1.4 MAINTENANCE

- A. Provide the following spare parts:
 - 1. One surge suppressor for every 10 or fraction thereof
 - 2. One installed terminal block, for every 10 or fraction thereof
 - 3. Ten percent spare corrosion inhibitors, minimum of 1 of each size provided
 - 4. Two breakers of each size provided
 - 5. One convertor module of each type used
 - 6. One switch of each type used
 - 7. One indicating light of each type used
 - 8. One alarm buzzer of each type used
 - 9. One signal isolator of each type used
 - 10. One panel meter/indicator of each type used
 - 11. One filter of each type used
 - 12. One fan of each type used
 - 13. One heater of each type used

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Provide panels and enclosures that meet the NEMA requirements for the type specified.
- B. Fabricate panels, install instruments, and wire in the factory. Test wiring prior to shipment. Use numbered terminal blocks for external connections.

- C. Provide instrument loop power supplies, mounting hardware, terminal blocks, control circuit breakers, and other items required for a fully operable panel.
- D. Provide termination panels, if required. Include terminal blocks, interface hardware, wiring, and cabling necessary for a complete operational system.
- E. Use panel fabrication techniques that allow for removal and maintenance of all equipment after installation.
- F. Provide panels and enclosures amply sized to house all equipment, instruments, front panel mounted devices, power supplies, power distribution panels, wiring, tubing, and other components installed within.
- G. Provide panels rated NEMA 4X when located in process areas or outdoors (except areas classified as hazardous locations), unless specified otherwise. Provide all panels corrosion resistant.
- H. Provide lifting rings on panels in excess of 100 pounds.
- I. Size panel based on the equipment provided.
- J. Panel Mounted Equipment
 - 1. Unless otherwise specified, provide components to operate on 120 VAC single phase 60-Hertz power.
 - 2. Provide 24 VDC two-wire transmitter power supplies as required.
 - 3. Provide signal isolators for each analog input and output signal to protect panel mounted equipment from electrical surges induced in field wiring.
 - 4. Provide engraved laminated nameplates to identify each panel mounted component. Provide nameplates with black lettering, 3/16-inch height minimum, on white background.
- K. Provide enclosures with louvers and forced ventilation for panels located indoors, and air conditioners for panels located outdoors or in non-conditioned areas as required to prevent temperature build-up to protect equipment with ambient temperatures of up to 105 degrees F. Except for enclosures mounted with their backs directly adjacent to a wall, place louvers in the rear of the enclosure, top and bottom. For enclosures mounted with their backs directly adjacent to a wall, place louvers on the sides.
- L. Provide any inputs or outputs required for system diagnostics such as analog to digital converter check points, system alarms, cold junction compensation, cabinet temperature indications, and power supply voltage checks.

- M. Where enclosures are mounted outside or in unheated areas, provide them with thermostatically controlled heaters that will maintain the inside temperature above 40 degrees F.

2.2 PANEL CONSTRUCTION

A. NEMA 4X Panels

1. Fabricate NEMA 4X enclosures from Type 316 stainless steel.
2. Provide non-corrodible metal hardware including hinge and cover clamps.
3. Do not paint stainless steel enclosure exterior surface.
4. Sandblast, roughen, or chemically etch stainless steel enclosures to reduce gloss, reflections, and glare.
5. Provide conduit knock-outs prior to installation of equipment inside enclosure. Provide water tight conduit hubs. (Double locknuts are not acceptable.) Top penetrations are not acceptable.
6. Provide handle-operated, oil-tight, key-lockable three point stainless steel latches. Key alike all project enclosures.
7. Rolled lip around three sides of door and along top of enclosure opening.
8. Hasp and staple for padlocking.
9. Provide a clear plastic, gasketed lockable hinged door to encompass all non-NEMA 4 front of panel instruments.
10. Manufacturers:
 - a. Hoffman Enclosures
 - b. Rittal Corporation
 - c. Saginaw Control & Engineering
 - d. Or approved equal

2.3 PANEL GROUNDING

- A. Provide 2 ground buses in each cabinet or panel, one for shield and cabinet grounding and one for signal grounding.
- B. Provide grounding lugs for connection to the external grounding system.

- C. Provide ground busbars, directly wired and connected to facility grounding system.
- D. Provide DC ground bus (for analog cable shield termination) bonded to chassis ground.
- E. Provide nickel-plated copper busbars, with current rating of 100 amperes.
- F. Provide each busbar with at least twenty (20) screw clamp terminal blocks, each capable of accepting #10 AWG conductors.
- G. Provide ground lug on each door and connect lug to the ground bus within panel.

2.4 PANEL WIRING

- A. Terminate all wiring, to and from field devices, at panel terminal blocks, not on equipment terminals.
- B. Do not terminate more than two wires at the same terminal. Wiring splices and wire nuts are not be permitted within the enclosure.
- C. Use flexible stranded copper wiring. Run wires in continuous lengths from terminal to terminal. Do not splice wires.
- D. For analog signal wiring, use uniformly twisted shielded pairs not smaller than 16 AWG with a minimum of six twists per foot. Separate analog signal wiring at least six inches from power wiring. Provide continuous foil or metalized plastic shields with 100 percent coverage. Include a drain wire in continuous contact with the shield.
- E. Use type THHN/THWN power wiring with insulation rated at 600 V. Use 14 AWG or larger for power wiring.
- F. Segregate signal wiring from control and power wiring. Group wiring functionally and arrange neatly to facilitate tracing of circuits.
- G. Use plastic wiring wraps to bundle wires, outside of wiring ducts. Securely fasten the bundles to the steel structure at intervals not exceeding 12 inches. Use Panduit, or equal wiring ducts and size to provide a minimum of 100% spare capacity.
- H. Do not intermix signals within the same bundle or duct.
- I. Use twisted unshielded wire for other DC signals and segregate from wire conducting AC signals.
- J. Provide wire identification at each wire end. Utilize computer-generated, heat-shrink type wire markers.

- K. Install all wiring in plastic wiring ducts, provided with snap-on covers. Size ducts to include at least 100% spare capacity. Restrain all wiring outside of ducts with plastic ties.
- L. Group and wrap all wires passing a door hinge in protective wire harness. Provide abrasion protection for wire bundles passing through holes or across sheet metal edges.
- M. Provide panel wiring of stranded copper with 600-Volt rated thermoplastic insulation.
 - 1. Power wiring: No. 14 AWG minimum
 - 2. Control wiring: No. 16 AWG minimum
 - 3. Electronic signal wiring: No. 16 twisted shielded pair minimum
 - 4. Ethernet network wiring: Category 6 minimum
 - 5. Other serial communication cables: As recommended by equipment manufacturer.
- N. Provide wire color convention complying with NFPA 79 (2015), part 13:
 - 1. Line, load, and control conductors: black.
 - 2. Neutral: white.
 - 3. Equipment safety ground: green.
 - 4. AC control circuit: red
 - 5. DC control circuit: blue
 - 6. Foreign voltage control wire: yellow
 - 7. Energized when main disconnect it off: orange
- O. Physically separate AC wiring from DC wiring.
 - 1. Where AC and DC wiring runs in parallel, provide at least 2-inch separation.
 - 2. Where AC and DC wiring cross, cross at 90°.
- P. Do not daisy-chain neutral wiring and grounding conductors at equipment terminals. Provide terminal blocks that accept jumper bridges.

- Q. Protect network cables using cable management supports.

2.5 TERMINAL BLOCKS

- A. Wire and terminate equipment in accordance with the latest standards of the National Electrical Code as well as state and local electrical codes.
- B. Provide terminal blocks for field wiring and equipment wiring terminations. Provide unique identification at each terminal block.
 - 1. Arrange terminal blocks in consecutively, based on standard alphanumeric order.
 - 2. Group terminal blocks based on voltage level and function.
 - 3. Color code foreign voltage terminal block identification to match wire insulation.
- C. Provide at least 25% spare terminal blocks for each type used in each enclosure.
- D. Provide high-density modular type terminal blocks suitable for mounting on standard DIN rails.
 - 1. Material: Nylon
 - 2. Termination type: tubular screw with serrated pressure plate
 - 3. Current carrying parts (metal bodies): nickel or tin-plated copper
 - 4. Ground terminal blocks with dual color type: Green and Yellow
 - 5. Maximum conductor size: No. 8 AWG stranded
 - 6. Current rating: Up to 15 amperes at 250 VAC
 - 7. Provide manufacturer jumper bridges, designed to fit on terminal blocks. Do not daisy-chain wiring.
- E. Provide fused terminal blocks or DIN rail mounted circuit breakers for panel power distribution.
 - 1. Provide disconnect lever and fuse-puller mechanism
 - 2. Provide illuminated indication of blown fuse
 - 3. Provide standard 1/4" by 1-1/4" fuses, and sized to protect load

4. Provide DIN Rail breakers with trip indication and mechanical reset
- F. Provide two-level type terminal blocks for PLC discrete input and outputs, with both levels of the feed-through types.
- G. Provide three-level type terminal blocks for analog signal wiring, with top and center terminations of the feed-through types, and bottom termination grounded to isolated mounting railing, connected to the DC ground bus.
 1. Provide factory assembled terminal blocks on a mounting channel and bolt the channel to the inside of the panel. Space terminal block strips no closer than 6 inches center to center.
 2. Provide screw type 600 V terminals with pressure plate to accept wire size #14 AWG and smaller. Do not use miniature terminal blocks.
 3. Provide a continuous marking strip with the terminals. Provide a separate terminal for terminating each shield wire.
 4. Reserve one side of each terminal strip for field incoming conductors. Do not make common connections and jumpers required for internal wiring on the field side of the terminal. Terminate no more than two wires at any one terminal.
 5. Provide a minimum of 25 percent spare terminals per terminal type, per panel.
- H. Manufacturers:
 1. Phoenix Contact
 2. Allen Bradley
 3. Weidmuller
 4. Or approved equal

2.6 PANEL MOUNTED EQUIPMENT

- A. Provide panel heaters, vapor type corrosion inhibitors and breather drains for condensation and corrosion control inside panel. Provide panel heaters of the forced air types, complete with thermostatic control.
 1. Manufacturers:
 - a. Cortec

- b. Hoffman
 - c. Or approved equal
- B. Provide one (1) UPS supply receptacle, 120 VAC, 20A duplex type.
- C. Provide one (1) “service receptacle”, 120 VAC, 20A duplex, GFCI grounding type receptacle.
- D. Provide one (1) 120 VAC 24” LED light fixture and protective plastic shield.
- E. Provide one (1) 120 VAC, 20A, snap switch, to turn on the light, mounted in an outlet box with a cover and located so that it is easily accessible from access door.
- F. Interposing Relays
 - 1. Provide interposing relays to interface all PLC discrete outputs with field-mounted equipment.
 - 2. Provide high density, DIN rail mounted type relays, with coils, contacts, and voltage ratings as required. Provide contacts rated 10 Amperes at 120 V minimum. Provide all relays with LED indicator to indicate coil status.
- G. Regulated Power Supplies
 - 1. Provide regulated DC power supply as required for 2-wire analog loops. Size power supplies to include 100% spare capacity. Do not power more than three transmitter loops from the same power supply.
 - 2. Provide power supplies as follows:
 - a. Input power: 120 VAC, 60 Hz.
 - b. Output power: 24 VDC at 200 mA or 500 mA, as required
 - c. Output regulation: <1%
 - d. Operating temperature: 0 to 50° C
 - e. DIN Rail mountable.
 - 3. Manufacturers:
 - a. Phoenix Contact
 - b. Action Instruments

- c. Sola
- d. Puls
- e. Or approved equal

H. Uninterruptible Power Supply

1. Provide new panel mounted uninterruptable power supply (UPS).
2. Provide UPS that provides a minimum of 30 minutes of back power with all equipment in full operation. Submit calculations demonstrating the 30 minute capability. Provide UPS that provides power surge protection at all times including when not operating off the batteries. Provide UPS that meets lightning standard per ANSI/IEEE C62 41 Category A (3000 Volt spike and 200 amp) and Category B (600 Volt spike and 3000 amp). The UPS must reduce the spike to less than three volts on the output, for 200 to 1 spike attenuation. Provide UPS that provides computer grade sine-wave power with five percent or less total harmonic distortion. Provide UPS with 120 VAC single phase input voltage. Provide UPS with no measurable break in the output during transfer from the normal AC line supply to the inverter battery supply or back to line.
3. Provide UPS with minimum overload capability of 125 percent for 10 minutes, 150 for 6 minutes, and 110 percent indefinitely.
4. Provide the UPS with a relay interface card, and alarms available as dry contacts for wiring to the PLC.
5. Provide built-in sealed, low maintenance, lead acid batteries, easily replaceable with standard tools.
6. Manufacturers:
 - a. Eaton PW9130L1500T-XL
 - b. Or approved equal.

I. Control Devices and Pilot Lights

1. General: Provide heavy-duty type, 30.5MM, oil-tight, watertight, and corrosion resistant pushbuttons, selector switches, and indicating lights. Provide a legend plate at each device.
2. Contact block current rating: 10 amperes at 240 VAC.

3. Provide all pilot lights of the LED type, with LED color matching the lens cover color. Provide flashing lights where indicated.
4. Provide pilot light colors as follows:
 - a. Red: Running
 - b. Green: Off
 - c. Amber: Fault Condition
 - d. Blue: Indicator
 - e. White: Power On/Available
5. Manufacturers:
 - a. Allen Bradley
 - b. Eaton
 - c. Schneider Square D
 - d. Or approved equal

J. Signal Isolators

1. Provide 4-wire type for use as a signal isolator, converter and/or repeater.
2. Input Signal: 4-20 mA DC, field configurable for other signal ranges.
3. Input Impedance: No greater than 50 ohms.
4. Isolation: 1000-Volt RMS output from input, power and ground; fully floating
5. Output Signal: 4-20 mA DC into 800 ohms minimum.
6. Accuracy: +/- 0.1% of span
7. Power Supply: 120 VAC, 60 hertz or 24 VDC from UPS at DTC
8. Enclosure: designed for high density DIN rail mount
9. Isolators are not scheduled.

- a. Provide isolators on all analog inputs to the PLC (unless the PLC is provided with isolated analog input modules).
- b. Provide as shown and as necessary to eliminate ground loop problems when connecting instruments to other instrument loops.

10. Manufacturers:

- a. Phoenix Contact
- b. Action Instruments
- c. Moore Industries
- d. Or approved equal

2.7 ENCLOSURE OPTIONS

A. Heaters for Condensation Control

- 1. Provide thermostatically controlled, fan driven heaters for all outdoor enclosures for condensation control unless otherwise specified
- 2. Meet the following requirements:
 - a. Power: 115 VAC, 60 Hz
 - b. Rating: 100 Watts for panels smaller than 24 in by 48 in
- 3. Provide thermostats that sense air temperature in the panel and are adjustable from 40 to 80 degrees F.
- 4. Mount heaters near the bottom center of the enclosure. Do not mount electronic components closer than 6 inches to the heater.
- 5. Manufacturers:
 - a. Hoffman Design Aire Electric Heater
 - b. Hammond
 - c. Or approved equal.

B. Corrosion Inhibitors.

- 1. Provide enclosures with vapor phase protective corrosion inhibitors

2. Provide adequate corrosion inhibiting devices, tape, or emitters for the individual panel volume
3. Activate the inhibitor upon delivery to the site. Do not store panels with inhibitors inactive. If necessary, cover panels to reduce ventilation and prolong inhibitor life.
4. Manufacturers:
 - a. Hoffman A-HCI-5E or -10E
 - b. Or approved equal

C. Air Conditioning Unit

1. For panels located outdoors or in non-conditioned space, provide panel mounted air conditioning unit. Air conditioning unit to be supplied for operation on 120 VAC, single phase, 60 Hz, powered from a circuit breaker within the control panel.
2. Provide an adjustable internal panel thermostat for control of Air Conditioner to activate on high temperatures inside panel.
3. Provide air conditioning unit meeting the following features:
 - a. Maximum current draw: 6A at 120 VAC
 - b. Corrosion resistant
 - c. Stainless steel enclosure
 - d. Maintain NEMA rating on installed panel
4. Manufacturers:
 - a. Hoffman/Pentair
 - b. Or approved equal.

2.8 SOURCE QUALITY CONTROL

A. Tests and Inspection

1. Test each panel in conjunction with factory acceptance test as described in Section 40 90 00 - Process Control System General Requirements.

PART 3 EXECUTION

3.1 PREPARATION

A. Sequence enclosure installation as follows:

1. Prior to installation, remove enclosure door, internal panels, and equipment from enclosures.
2. Install enclosures and conduits, and pull field wiring into enclosures.
3. Seal all wire entries with non-setting silicon compound to prevent moisture from entering enclosure.
4. Cover enclosure installation thoroughly with heavy-duty plastic sheet to protect against moisture, paint splatter, and dirt. Cover until 120-Volt power is available, and enclosure is ready to receive internal panel.
5. Terminate field wiring on terminal blocks.
6. Energize panel heater and keep enclosure door closed when no work is being performed in enclosure. (Do not energize any other equipment prior to field wiring termination check.)
7. Check accuracy of field wiring termination. Thoroughly test for continuity.
8. Energize panel mounted equipment only after all wiring has been thoroughly checked and tested.
9. Energize panel heater to prevent condensation inside the panel.

3.2 ERECTION, INSTALLATION, AND APPLICATION

- A. Do not install control panels or enclosures directly against concrete walls. Provide stainless steel channels between wall and enclosure. Mount enclosure to stainless steel channels.
- B. Install enclosures and panels level and plumb. Touch up all nicks, scratches, etc. with materials recommended by enclosure manufacturer.
- C. Vacuum and clean all panel interior surfaces prior to system commissioning.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspection

1. Demonstrate that each enclosure and each panel mounted equipment:

- a. Has not been damaged during transportation or installation
- b. Has been properly installed
- c. Has no mechanical defects
- d. Is in proper alignment
- e. Has been properly wired and connected

3.4 DEMONSTRATION

- A. Test all control function as described in Division 1 and Section 40 90 00 - Process Control System General Requirements, and Section 40 98 50 - Process Control System Factory Testing. In addition, perform the following:
 - 1. Calibrate all process variable indications
 - 2. Adjust all alarm setpoints
 - 3. Tune all control function to achieve optimum and stable control

3.5 SCHEDULES

- A. Reference Contract Drawings and the following table for list of control panels. Data presented on the following table is for the convenience of the CONTRACTOR. Provide all control panels of size and type required by the contract documents and including all components required for the operation of the equipment as described.

CONTROL PANEL SCHEDULE

Panel	Qty	Location	Panel Type	NEMA Rating	Comments
PLC V-RF08 Panel	1	V-RF08 Valve Vault	Free- Standing	4X	Provided by CONTRACTOR

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 40 98 50

PROCESS CONTROL SYSTEM FACTORY ACCEPTANCE TESTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section 40 98 50 specifies technical requirements for fabrication, engineering, wiring, and factory testing of Process Control System (PCS) components and functions installed as part of the GWA project, Contract Package 5 (CP5).
- B. The OWNER and ENGINEER may witness test equipment covered by this Specification Section at any time during manufacturing, assembling, and/or testing.
- C. CONTRACTOR: Provide the OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE copies of the factory test plan and certified factory test results.
- D. CONTRACTOR: Provide the OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE sets of complete factory test procedures. These factory test results and the test procedures will be reviewed and accepted by the OWNER/ENGINEER and RESIDENT PROJECT REPRESENTATIVE prior to the testing date.
- E. CONTRACTOR: Provide the OWNER, ENGINEER, and RESIDENT PROJECT REPRESENTATIVE the factory testing date in writing. Give a minimum of two weeks advance notice prior to the factory testing.
- F. CONTRACTOR is responsible for scheduling the factory acceptance test.
- G. Related Work Specified in Other Sections Includes, But is Not Limited to the Following:
 - 1. Section 01 33 00 - Submittals
 - 2. Section 40 80 50 - Process Control System Commissioning
 - 3. Section 40 90 00 - Process Control System General Requirements
 - 4. Section 40 90 50 - Process Control System Description
 - 5. Section 40 91 00 - Process Control System Instruments
 - 6. Section 40 94 13 - Process Control Systems Computer and Network Hardware
 - 7. Section 40 94 43 - Programmable Logic Controller Systems
 - 8. Section 40 95 13 - Process Control System Panel Enclosure and Equipment

1.2 SUBMITTALS

- A. General: Provide all submittals as specified herein, and as specified in Section 01 33 00 - Submittals.
- B. Action Submittals:
 - 1. Submit data on the following as required in Section 40 90 00 - Process Control System General Requirements:
 - a. Test Plan
 - b. Test Forms
 - c. Test Sequence
- C. Informational Submittals:
 - 1. Submit data on the following as required in Section 40 90 00 - Process Control System General Requirements:
 - a. Test Schedule
 - b. Testing Tools
- D. Closeout Submittals:
 - 1. Submit data on the following as required in Section 40 90 00 - Process Control System General Requirements:
 - a. Test results: Provide copies of the certified factory test results.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 QUALITY CONTROL

- A. Tests and Inspection
 - 1. Certify for each enclosure and each panel mounted equipment:
 - a. All installed equipment is terminated and securely mounted

- b. All wiring is labeled
- c. All equipment is labeled
- d. All enclosures are labeled
- e. Wiring diagram is installed in cabinet.

3.2 DEMONSTRATION

A. Factory Tests

- 1. **SYSTEM INTEGRATOR:** Perform the factory acceptance test, including hardware and software test verification of the control panel included in CP5, including all network components and associated interfaces.
- 2. Replicate and simulate the control system network to demonstrate network communication between PLC systems, instruments, and all other interfacing devices.
- 3. Complete system programming prior to each factory test.

B. Factory Tests: Perform the following tests:

- 1. In-Factory Inspection and PLC I/O Testing (See Paragraphs D & E)
- 2. Graphical Interface and Software Testing (See Paragraph F)
- 3. Communication Failure Testing (See Paragraph G)
- 4. Power Failure/System Restart Testing (See Paragraph H)

C. Test Preparation

- 1. If the factory test will be witnessed (by either the OWNER, ENGINEER, or RESIDENT PROJECT REPRESENTATIVE), provide the following In-Factory Testing Aids and Equipment:
 - a. Provide the following documents:
 - (1) One copy of submittals applicable to equipment to be tested
 - (2) One copy of Drawings and Specifications, with Addenda and Change Orders
 - (3) One master copy of test procedure

- (4) Complete inventory of equipment to be tested including make, model, and serial number; identify firmware revision
 2. Meet following criteria prior to start of test:
 - a. Complete submittals and resolve disputes, if any
 - b. ENGINEER's review of test procedure
 - c. Include all processors, network interfaces, and I/O cards in testing
- D. In-Factory Inspection and I/O Testing
 1. Process Control System PLCs are required to pass in-factory inspection and testing prior to shipment to job site
 2. Perform In-Factory inspection and testing at site of panel fabrication.
 3. In-Factory Inspection:
 - a. Verify the following in accordance with approved submittals:
 - (1) Panel dimensions
 - (2) Equipment layout
 - (3) Wiring
 - (4) Wire and terminal identification
 - b. Verify proper access to equipment for maintenance
 - c. Verify proper access to field wire termination points
 - d. Inspect for neatness of wiring and wire harness construction
- E. In-Factory Testing
 1. Install Designer-configured PLC programming software, provided as part of the project, to permit the following:
 - a. Diagnostic test of PLC processor to assure proper run mode operation
 - b. Inspection of PLC data table to allow viewing of discrete input on/off status

- c. Inspection of PLC data table to view register contents when inputs are tested at 0, 4, 12, and 20 mA DC
 - 2. Test as follows:
 - a. Verify equipment and manuals against inventory lists
 - b. Run hardware diagnostics
 - c. Testing of all input and output (I/O) signals at terminal strip used for field terminations:
 - (1) Test analog inputs at 0, 4, 12, and 20 mA DC
 - 3. Correct any deficiencies discovered prior to shipment to job-site.
- F. Graphical Interface and Software Testing
- 1. Not Used.
- G. Communication Failure Testing
- 1. Test to demonstrate communication failure alarm when a network connection is lost:
 - a. Disconnect each data highway
 - b. Verify communication alarms and failure modes
- H. Power Failure / System Restart Testing
- 1. Remove main power to system and then reconnect to demonstrate system re-boot and start-up services and sequence for use by Operator.
- I. Documentation
- 1. Prepare in-factory inspection and testing sign-off document. Include following as a minimum:
 - a. Project description and number
 - b. Company name for PLC SUPPLIER, OWNER, and ENGINEER
 - c. Section labeled “In-Factory Inspection”, with listing of items to be inspected as described above
 - (1) For each item, include area for initials of PLC SUPPLIER’s,

OWNER'S, and ENGINEER's representative indicating
passing of inspection

- (2) Include area for handwritten notes of any corrections required

END OF SECTION